

POA L. IN NEW MEXICO,
WITH A KEY TO MIDDLE AND SOUTHERN ROCKY MOUNTAIN SPECIES
(POACEAE)

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ABSTRACT.—The 23 species and subspecies of *Poa* that occur in New Mexico are described in detail. Collection locations of these species in New Mexico are given in dot distribution maps. A descriptive key to the species of *Poa* that occur in Arizona, Colorado, Utah, Wyoming, and New Mexico, including general distribution for species not in New Mexico, is provided. Three new nomenclatural combinations are proposed: *Poa arctica* subsp. *aperta*; *P. fendleriana* subsp. *longiligula*; *P. f.* subsp. *albescens*. Subgeneric affinities of species of the southern Rocky Mountain region are indicated. Of the 25 species that occur within the region, the geographic affinities are: circumpolar (*P. alpina*, *P. arctica*, *P. glauca*, *P. interior*, and *P. leptocoma*), Beringian (*P. lettermanii*, and *P. pattersonii*), Eurasian weeds (*P. annua*, *P. bulbosa*, *P. compressa*, *P. palustris*, *P. pratensis* (also circumpolar), and *P. trivialis*), Pacific Northwest (*P. bolanderi*, *P. cusickii*, *P. nervosa*, and *P. stenantha*), northern Great Plains (*P. arida*), southern Great Plains and South American Pampas (*P. arachnifera*), Great Basin—Californian (*P. fendleriana* and *P. secunda*), and Middle and Southern Rocky Mountain (*P. bigelovii*, *P. curta*, *P. occidentalis*, *P. reflexa*, and *P. tracyi*). The only native diploid *Poa* species known in the Southern Rocky Mountains, the contiguous United States, and southern Canada are *P. lettermanii* and *P. occidentalis*.

POA L. (Bluegrass)

Low or moderately tall annuals or perennials, tufted, rhizomatous, or stoloniferous. *Blades* flat, folded, or rolled, tips usually curved and prowlike, glabrous on back, glabrous, scabrous, or pubescent above. *Sheaths* glabrous to pubescent, margins fused at least at base. *Ligules* membranous, sometimes hairy on back, smooth or minutely fringed terminally. *Inflorescence* an open or contracted panicle. *Spikelets* with 2—several (rarely 1) florets, disarticulating above glumes and between florets. *Glumes* narrow to broad, sharply acute to rounded, usually keeled on back, 1- to 3-nerved, shorter equaling or rarely longer than first lemma. *Lemmas* awnless, acute to rounded at apex, typically firm with scarios hyaline margin and tip, usually 5-nerved (3—11), prominently keeled on back or rounded (Secundae), glabrous scabrous or pubescent, with hairs confined to nerves or throughout, frequently with tuft of long cobwebby hairs from callus (pubescence characters are best seen on lower lemmas of spikelet). *Paleas* with chlorophyll (unlike *Koeleria*), two keels glabrous, scabrous, ciliate, or villous. *Flowers* perfect or unisexual (dioecious,

gynodioecious, gynomonecious). *Stamens* 3, anthers 0.2—4 mm long, or vestigial (early aborted). *Pistil* glabrous. *Caryopses* ellipsoidal and usually somewhat compressed ventrally, hilum oval, less than 2/5 the caryopses in length. *Lodicules* membranous, broadly lanceolate, usually lobed, 0.3—1.2 mm long. *Basic chromosome number* X = 7. (Reported 2n chromosome numbers are recorded in species descriptions, modal numbers are in italics, and frequent numbers are boldfaced.)

About 250 species in temperate and colder regions worldwide, extending into the subtropics and tropics as montane species and as cool-season grasses at low altitudes. Identification of *Poa* species is difficult because of the large number of species and because the limited variety of characters distinguishing them mostly overlap. In addition, our traditional species criteria fail in certain groups (i.e., *Poa*, *Stenopoa*, and *Secundae*) wherein the high frequency of asexual reproduction by seed (agamospermy), high polyploidy, and hybridization combine to make the variation more or less continuous among many of the taxa.

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This study was funded in part by a Sigma Xi "Grant-in-Aid of Research," The Scientific Research Society.

New Mexico county abbreviations: B = Bernalillo, DA = Dona Ana, CB = Cibola, CT = Catron, CV = Chaves, CF = Colfax, E = Eddy, GU = Guadalupe, GR = Grant, HD = Hidalgo, HR = Harding, LA = Las Alamos, LN = Lincoln, LU = Luna, MK = McKinley, MR = Mora, OT = Otero, RA = Rio Arriba, SD = Sandoval, SF = Santa Fe, SJ = San Juan, SM = San Miguel, SC = Socorro, SR = Sierra, V = Valencia, TO = Taos, TR = Torrence, U = Union.

Distribution records for all the species were checked at GH, NMC, NMCR, NY, UNM, US, UTP. Much of these data come from field-work, vouchers for which are housed at NMC.

Subgeneric classification of the species of *Poa* occurring in the Southern Rocky Mountains is as follows:

SUBGENUS	SECTION	SPECIES TREATED HERE
<i>Poa</i>		<i>P. pratensis</i> , <i>P. arctica</i>
	Bolbophorum	<i>P. bulbosa</i> , <i>P. alpina</i>
	A. & G.	
	Ochlopoa (A. & G.) Jiras	<i>P. annua</i>
	Coenopoa	<i>P. trivialis</i>
	Hylander	
	Diversipoa Chrtek & Jirasek	<i>P. bigelovii</i>

"unclassified"	<i>P. occidentalis</i> , <i>P. bolanderi</i> , <i>P. reflexa</i> , <i>P. tracyi</i> , <i>P. curta</i> (<i>sensu auct</i>)
Oreinos A. & G. Abbreviate	<i>P. leptocoma</i> , <i>P. lettermanii</i> , <i>P. pattersonii</i>
Nannf. ex Tzvel.	
Stenopoa Dumort.	<i>P. palustris</i> , <i>P. glauca</i> , <i>P. interior</i> , <i>P. nemoralis</i> .
Tricopoa A. & G.	<i>P. compressa</i>
"unclassified"	<i>P. arida</i>
"Secundae"	<i>P. secunda sensu lato</i> .
"unclassified"	<i>P. stenantha</i> .
<i>Dioicopoa</i> E. Desv. ex C. Gay	<i>P. arachnifera</i> [<i>P. fendleriana</i> , <i>P. cusickii</i> , <i>P. nervosa</i> ?]

KEY TO SOUTHERN ROCKY MOUNTAIN SPECIES OF *POA*

This key includes all the species of *Poa* found in Arizona, Colorado, Utah, Wyoming, and New Mexico. Species definitely known from New Mexico are typed in bold face. Those species not known from New Mexico are preceded by their general geographic distribution and followed by an author citation.

1. Anthers, most of them, over 1 mm long, or aborted (vestigial); flowers perfect, unisexual, or forming bulblets; perennial 10
- Anthers consistently 1 mm or less in length; flowers mostly perfect; annual or perennial 2
- 2(1). Callus of lemmas long webbed; lemmas glabrous to minutely scabrid on the keel; plants annual, of midmontane habitats, rare in n UT, ID, NV, and WA, mostly in CA, OR. *P. bolanderi* Vasey
- Callus of lemmas webbed or not; lemmas glabrous to pubescent, if webbed, then prominently pubescent at least on nerves; plants annual or perennial, of various habitats. 3
- 3(2). Callus glabrous; lemmas glabrous or with a few minute hairs on keel, 2.5-3 mm long, relatively broad, blunt at apex; spikelets 3-4 mm long, anthers averaging 0.6 mm long; alpine plants 2-10 cm tall; sw CAN, w US, to COL *P. lettermanii* Vasey
- Callus webbed or, if glabrous, lemmas prominently villous at least on keel; other characters various 4
- 4(3). Plant perennial, sometimes flowering first year, sometimes alpine; if flowering first year, then callus webbed and panicle branches eventually widely spreading or reflexed; palea keels various 6
- 5(4). Callus glabrous; panicles more or less open *P. annua*
- Callus webbed; panicles long and contracted. *P. bigelovii*
- Plants annual, rarely biennial, rarely alpine; callus glabrous and lemmas villous on all 5 nerves, or callus webbed and panicle narrowly contracted; palea more or less villous on keels 5

- 6(4). Plants 3–15 cm tall, tufted from narrow base; panicles narrow, short branched, little-exserted above basal leaves; callus sometimes webbed; lemmas pale green to purple, not bronze colored at tip, puberulous all over or pubescent only on nerves, rarely nearly glabrous; basal sheaths persistent, papery, upper ones closed $\frac{1}{4}$ the length or less; leaves green, soft, flat, lax; plants high alpine, on cold exposures, uncommon, sw CAN to UT and CO *P. pattersonii* Vasey
- Plants mostly over 15 cm tall, loosely tufted; panicle relatively broad, long branched, well exerted above basal tuft of leaves; callus webbed; other characters variable; plants of midelevations to low alpine 7
- 7(6). Sheaths closed $\frac{1}{3}$ or less the length; ligules mostly fringed on margins; first glume mostly 3-nerved (short anthered plants of *P. nemoralis* and *P. palustris*) 19
- Sheaths closed $\frac{1}{4}$ – $\frac{2}{3}$ the length; ligules entire or jagged, smooth on margins; first glume mostly 1-nerved 8
- 8(7). Sheaths rarely glabrous, more or less densely retrorse-scabrous; panicle (8) 13–40 cm long, internodes (3) 4+ cm long; palea nerves glabrous or sparsely scabrous; lemmas mostly sparsely puberulent between 5 nerves, mostly pale green, margins and tips white-hyaline or sometimes purple tinged; plants of midmontane forested habitats *P. occidentalis*
- Sheaths glabrous, roughened, or sparsely retrorse-scabrous; panicle mostly less than 12 cm long, internodes shorter than 3.5 cm; palea nerves mostly villous or ciliate-scabrous; lemmas rarely pubescent between the nerves, pale green to strongly purplish, tips bronze tinged or white-hyaline; plants usually of more moist subalpine and alpine habitats 9
- 9(8). Palea keels glabrous, scabrous, or with relatively regularly spaced, antrorsely curved, ciliate hairs, internerves with long cells only; glumes and lemmas narrowly lanceolate, unequal, first very narrow; lemmas sharply acute, intermediate nerves usually obscure, never villous; plants of wet habitats . . . *P. leptocoma*
- Palea keels rarely glabrous, mostly villous-pilose, internerves with both short and long cells; glumes and lemmas broadly lanceolate, glumes subequal; lemmas bluntly acute, intermediate nerves frequently distinct, frequently somewhat villous; plants of wet or dryish habitats *P. reflexa*
- 10(1). Florets normally forming leafy bulblets; plants tufted, culms somewhat bulbous at base *P. bulbosa*
- Florets not normally forming bulblets; habits various, but culms not bulbous at base 11
- 11(10). Callus glabrous (infrequently with hairs similar to and continuous with those of lemma-keel), or (in *P. stenantha* and less often in *P. secunda*) with short, relatively straight hairs generally distributed around top of callus, these not restricted to dorsal side 22
- Callus webbed with tuft of short-kinky or long-sinuate hairs on dorsal surface, these isolated from those of lemma-keel 12
- 12(11). Plants dioecious, rhizomatous; panicle oblong, compact, terminal branches densely flowered from near base and, at least in female plants, densely scabrous; plants of se Great Plains, rare and doubtfully native in our area *P. arachnifera*
- Plants perfect flowered (rarely pistillate); if pistillate, panicles more open, branches sparsely flowered in distal $\frac{1}{2}$ 13
- 13(12). Sheaths closed $\frac{1}{2}$ – $\frac{9}{10}$ length; flowers perfect with anthers averaging 2.2 mm long, and/or pistillate with vestiges of anthers; panicles mostly 13–29 cm long, lower internodes mostly over 3.5 cm long, branches widely spreading to sharply reflexed; tall subrhizomatous plants *P. tracyi*

- Sheaths closed ca $\frac{1}{2}$ or less the length; flowers normally all perfect; panicles mostly less than 13 cm long, internodes rarely over 3.5 cm long (if panicles and internodes longer, then lemmas glabrous between nerves and anthers less than 1.9 mm long); habits various. 14
- 14(13). Culms and nodes strongly flattened; plants strongly rhizomatous; sheaths closed $\frac{1}{4}$ or less the length; panicle short, compact to loose, with short branches; spikelets compact; ligule ciliate margined; lemma with a weak web *P. compressa*
- Culms and nodes not decidedly flattened; other characters variable 15
- 15(14). Plants densely tufted (or in damp habitats with only a few culms in a bunch and then decumbent at base and rooting at nodes, but not definitely rhizomatous); sheaths closed near base to ca $\frac{1}{5}$ ($\frac{1}{4}$) the length (to ca $\frac{1}{2}$ in *P. trivialis*); panicle branches distinctly scabrous, mostly angled. 18
- Plants with strong rhizomes present; sheaths closed ca $\frac{1}{3}$ – $\frac{1}{2}$ the length; panicle branches glabrous to sparsely scabrous, terete. 16
- 16(15). Glumes distinctly keeled, scabrous on nerves, second evidently shorter than first lemma; lemmas villous on keel and marginal nerves, glabrous between them (intermediate nerves rarely distinct, rarely sparsely pubescent); callus strongly webbed; ligules truncate, fringe margined; panicle often with 4 or more branches at lowest node; plants mostly lower than alpine *P. pratensis*
- Glumes weakly keeled, nearly glabrous, second subequal to or longer than first lemma; lemmas villous on keel and marginal nerves and frequently on intermediate nerves, often puberulent between nerves; callus hairs variable; ligules truncate to long-acute, entire; panicle usually with fewer than 4 branches at lowest node; plants subalpine and alpine 17
- 17(16). Callus web scant and short to long and copious; panicles loose, branches flexuous; culms not wiry, mostly single, with several sterile shoots; ligules truncate to acute. *P. arctica* subsp. *grayana* (*sensu lato*)
- Callus web scant, short; panicles narrow or wide open, branches strict; culms wiry, mostly closely tufted, with relatively few sterile shoots; ligules acute to acuminate. *P. arctica* subsp. *aperta*
- 18(15). Lemmas pubescent on keel below, glabrous or rarely very sparsely puberulent on marginal nerves, glabrous between nerves; ligules 3–10 mm long, entire or lacerate; first glume very narrow, 1-nerved, curved inward. *P. trivialis*
- Lemmas pubescent on keel and marginal nerves and often between nerves; ligules less than 4 mm long, often minutely ciliate fringed on margins; first glume very narrow or quite broad, 3-nerved, not strongly arched inward; (long-anthered individuals of *P. pattersonii* may key out here, see lead 6) 19
- 19(7,18). Culms somewhat scabrous near nodes, stout, leafy to well above middle, frequently decumbent and rooting at nodes, sometimes branching above base, mostly 25–120 cm tall; ligules (1) 2–6 mm; panicles mostly 10–30 cm long, branches with abundant tertiary branching, many flowered; lemmas glabrous between keel and marginal nerves, abruptly incurved near tip; callus-web well developed; rachilla glabrous or scabrous. *P. palustris*
- Culms mostly glabrous near nodes, either, "lax, slender, leafy to above middle," or, "wiry, strict, with few leaves, these mostly in lower $\frac{1}{3}$," never decumbent and rooting at nodes, never branching above base, height variable; ligules 0.2–3 mm long; panicles mostly shorter (except in *P. nemoralis*), main panicle-branches unbranched or with some secondary branches, mostly fewer flowered; lemmas glabrous or pubescent between keel and marginal nerves, not abruptly incurved near tip; callus-web from a minute tuft to well developed; rachilla glabrous, scabrous, or puberulent 20

- 20(19). Glumes very narrow (subulate), margins nearly straight; anthers 0.8–1.2 mm long; ligules nearly absent to 0.2 (1) mm long, truncate, pubescent on back, fringe margined; panicles many flowered, 5–25 cm long, branches widely spreading; foliage green; introduced, rare in w US, not known from our region *P. nemoralis* L.
- Glumes broader, margins of second frequently angled outward; anthers (1) 1.2–2 mm long; ligules various; panicles mostly fewer flowered, mostly less than 12 cm long, branches ascending; foliage green or glaucous; native species 21
- 21(20). Lemmas glabrous between nerves, rarely sparsely villous on intermediate nerves; callus web short or infrequently absent; plant green; culms erect, lax to slender-wiry, often geniculate at lower nodes, uppermost node in middle $\frac{1}{3}$; ligules ca 0.3–1.5 (2) mm long, scabrous on back, truncate, fringe margined; glumes sharply keeled, sharply acute and frequently curved in or out at tip; panicles 2–15 cm long, somewhat lax (or strict in small alpine forms), branches slender *P. interior*
- Lemmas mostly pubescent between nerves or pubescent on intermediate nerves; callus web well developed to frequently absent; plant green or glaucous; culms erect or spreading, stout to wiry, strict, uppermost node in near base; ligules 1–3+ mm long, similar to *P. interior* or, more often, rounded to obtuse and lacerate and then less scabrous on back and not or weakly fringe margined; glumes similar to *P. interior*, or less sharply keeled, more obtuse at tip and tips not divergent; panicles mostly less than 6 cm long, strict, branches more stout *P. glauca* (*sensu lato*)
- 22(11). Sheaths closed $\frac{2}{3}$ – $\frac{9}{10}$ the length, glabrous; panicles 10–20 cm long, open and diffusely flowered, lowest axial internodes mostly 2.5–6 cm long, branches mostly reflexed; plants loosely tufted, short-rhizomatous, perfect-flowered or anthers of some or most flowers vestigial; lemmas strongly keeled, glabrous to sparsely hirtelous or puberulent on keel base and between nerves near base; plants of midmontane habitats, uncommon, ne UT, w ID, w WY, possibly to sw CAN *Poa curta* (*sensu. auct non Rydb.*)
- Sheaths closed $\frac{9}{10}$ to only near base, if closed over $\frac{2}{3}$ length and plant rhizomatous, then panicles mostly less than 13 cm long, axial internodes less than 2.5 cm long, branches mostly ascending, and at least lower sheaths puberulous; panicles various, mostly more condensed, or axial internodes mostly less than 2 cm long, branches mostly ascending; plants rhizomatous or not, variously flowered, lemmas various; plants of various habitats, mostly more widespread. 23
- 23(22). Flowers predominantly perfect, stamens and stigmas more or less synchronously developed (remnants of a few anther sacs usually remain on even the most mature plants, filaments persistent); lemmas keeled or not; sheaths frequently closed $\frac{1}{4}$ the length or less (unless rhizomatous) 30
- Flowers pistillate (anthers vestigial or partially developed but nonfunctional) or staminate (ovaries and stigmas very reduced or undeveloped) or infrequently perfect in part; lemmas keeled on the back; sheaths closed $\frac{1}{3}$ – $\frac{9}{10}$ the length. 24
- 24. Plants strongly rhizomatous; culms few, loosely tufted; upper culm blade well developed; basal tuft of leaves weakly developed; ligules of lower culm leaves obtuse to truncate, finely scabrous to puberulent on back; spikelets green; lemmas villous to scabrous on keel and marginal nerves and mostly scabrous between; sheaths (at least lower ones) finely puberulent (rarely nearly glabrous); midmontane forest openings and thickets, to lower alpine, widespread *P. nervosa* var. *wheeleri*

- Plants tufted, culms several to many or, if stolonous or rhizomatous, then the upper culm blade mostly very reduced; basal tuft of leaves well developed (except in *P. epilis*); ligules various; spikelets green or pale green and shining; lemmas and sheaths various; plants of various habitats 25
- 25(24). Lemmas sparsely to prominently pubescent on keel and marginal nerves, sometimes pubescent on intermediate nerves, and infrequently between nerves 28
- Lemmas scabrous to glabrous, less commonly finely and very sparsely puberulous on the lower keel and marginal nerves 26
- 26(25). Plants tufted, short-rhizomatous; culm blades strongly reduced upward, uppermost blade reduced or absent on most culms; basal blades relatively broad (1–3.5 mm wide) and firm; sheaths mostly smooth to sparsely scabrous, collar margins spiculate; ligules 0.25–1 (2) mm long, truncate to rounded, very scabrous on back, fringed on upper margin; lemmas mostly very smooth, sparsely scabrous to very sparsely puberulent on keel and marginal nerves, glabrous between nerves; plants of Sierra Madre Occidental *P. fendleriana* subsp. *albescens*
- Plants densely tufted, never rhizomatous; culm blades not regularly and strongly reduced upward, uppermost blade mostly over 1 cm long; basal blades mostly 1 mm broad or less; ligules various; lemmas glabrous, or scabrous on nerves and frequently between them, infrequently very sparsely puberulous on keel; plants not known from south of s UT-CO state line in interior United States. 27
- 27(26). Panicle axis and branches moderately to densely scabrous; blades mostly basal, mostly filiform, involute, culm blades few, occasionally broader above and to 1.5 mm wide; culm sheaths more or less scabrous, mostly covering nodes, upper sheath often rather loose; lemmas scabrous on nerves, and usually between them, never glabrous all over; spikelets pale green, shining; plants either pistillate or staminate; n Great Plains grasslands, high sagebrush communities to alpine grasslands, widespread nw US, sw CAN, infrequent in n UT and CO (*P. subaristata* Rydb. form in Rocky Mts.) *P. cusickii* Vasey subsp. *cusickii*
- Panicle axis and branches smooth to infrequently moderately scabrous; blades about equally basal and cauline, basal ones usually filiform, involute, culm blades generally broader and flatter and mostly over 1.5 mm wide; culm sheaths mostly glabrous, mostly exposing culm nodes; lemmas glabrous or scabrous on and between nerves, rarely very sparsely puberulous on keel; spikelets green, often purple tinged; flowers pistillate; subalpine to alpine, common w US, sw CAN, to s UT and CO *P. cusickii* subsp. *epilis* (Scribn.) W. A. Weber
- 28(25). Lemmas more or less evenly pubescent over basal portion; plants densely tufted, lacking any rhizomes; blades very narrow, basal ones less than 1 mm wide, uppermost blade usually filiform and over 5 mm long; flowers rarely with well developed anthers; dry hills, w ID, w MT, w WY, ne UT, nw CO, and across northern plains of CAN, in ALB, SKW, MAN. (Although the type of this is like *P. cusickii*, many of the plants that key-out here are more like *P. fendleriana* in having firm, broader, folded blades, with the upper ones very reduced. This taxon appears to have evolved from hybridization between the two species) *P. cusickii* subsp. *pubens* Keck
- Lemmas strongly villous on keel and marginal nerves, infrequently pubescent between nerves; plant more loosely tufted, mostly with short, lateral, rhizomatous shoots; blades over 1.5 mm wide, uppermost blade, when present, firm, mostly very reduced; flowers pistillate or staminate, (staminate plants found occasionally in CO and more frequently to south and west); widespread 29

- 29(28). Ligules from merely a spiculate ridge to 1 (2) mm long, truncate to rounded and minutely fringed terminally, mostly quite scabrous on back; sheaths mostly scabrous (especially so on margins about collar) or finely puberulous; lemmas infrequently villous on intermediate nerves, glabrous between nerves. *P. fendleriana* subsp. *fendleriana*
- Ligules 1.8–11 mm long, obtuse, acute, or acuminate, mostly sparsely scabrous to glabrous on back, entire; sheaths glabrous to scabrous or minutely puberulous, but not distinctly so on margins near collar; lemmas occasionally villous on intermediate nerves, glabrous or occasionally sparsely puberulent between nerves. *P. fendleriana* subsp. *longiligula*
- 30(23). Anthers not more than 1.2 mm long; lemmas distinctly keeled; foliage bright green; panicles not much exerted above basal tuft of leaves; blades less than 2 mm broad, soft, lax; plants narrowly-tufted, 2–15 cm tall; plants of high alpine situations, with both vegetative and fertile shoots; uncommon. (see *P. pattersonii*, couplet 6)
- Anthers usually more than 1.2 mm long; lemmas keeled or not; foliage green or glaucous; panicles well exerted above basal tuft of leaves; blades various; plants, if less than 15 cm, tall and alpine, then tufts dense, (in *P. glauca*, most shoots fertile, leaves relatively firm and strict). 31
31. Lemmas prominently pubescent; sheaths closed $\frac{1}{3}$ – $\frac{1}{2}$ the length, or, open most of length. 34
- Lemmas glabrous or scabrous, rarely very sparsely puberulent on keel; sheaths open most of length. 32
- 32(31). Ligules 2.5–6 mm long, acute or acuminate, glabrous or sparsely scabrous on back *P. secunda* (*P. nevadensis* form)
- Ligules 0.25–4 mm long, truncate to obtuse, sparsely to densely scabrous on back; culms in large loose tufts (plants rarely rhizomatous). 33
33. Foliage somewhat coarse; blades involute, mostly less than 1.5 mm wide; plants mostly of low mountains and desert plains in poorly drained soils, Great Basin, WA to MT, south to UT and CO *P. secunda* (*P. juncifolia* form)
- Foliage more lax; blades flatish, mostly 1.5–3 mm wide; plants of high sagebrush slopes and higher, mostly of well-drained, rich soils *P. secunda* (*P. ampla* form)
- 34(31). Plants densely tufted; lemma pubescence variable 36
- Plants rhizomatous; lemma pubescence definitely stronger on nerves than between them, or glabrous between them 35
- 35(34). Sheaths closed ($\frac{1}{4}$) $\frac{1}{3}$ – $\frac{1}{2}$ the length; glumes weakly keeled; lemma tips acute; callus glabrous or with an inconspicuous web; panicle branches strict or flexuous; plants subalpine to alpine *P. arctica* subsp. *grayana* s. str. (see also couplet 17)
- Sheaths closed $\frac{1}{5}$ the length or less; glumes strongly keeled; lemma tips often blunt; callus glabrous or with a few hairs continuous with and like those of the lemma keel; panicles and branches strict; plants of arid, alkaline plains and piedmont valleys, e (rare w) of continental divide *P. arida*
- 36(34). Upper sheaths closed more than $\frac{1}{4}$ the length; culm bases enclosed in persistent, thickened, closely overlapping sheaths; foliage green; spikelets broadly rounded, almost cordate at base; panicle branches glabrous to sparsely scabrous, terete, strongly divergent, intricately rebranched, and closely flowered; plants of moist alpine situations, circumboreal, to s UT and CO *P. alpina*

- Upper sheaths closed less than $\frac{1}{4}$ the length; culm bases not enclosed in persistent, thickened, closely overlapping sheaths; foliage green or glaucous; spikelets broadly rounded or more elongate, not at all cordate at base; panicle branches moderately to strongly scabrous, distinctly angled to terete, but the branches not strongly divergent, intricately rebranched, and closely flowered; plants of various situations 37
- 37(36). Lemmas distinctly keeled, 4–6 mm long, pubescence longer and stronger on nerves than between them, or glabrous between them; rachilla internodes mostly over 0.8 mm long; spikelets mostly over 7 mm long; panicles open, somewhat lax, mostly 7–17 cm long, lower panicle branches mostly more than 3.5 cm long, variously divergent, moderately scabrous on weak angles; plants 2.5–6 cm tall, with few flowering shoots and many vegetative shoots; blades mostly well over 3 cm long, soft, lax, bright green; ligules 2–4 mm long, obtuse to acute, entire to lacerate on margins; callus often with hairs across top around base of lemma (different from those of surface of lemma); plants of mountain slopes, AK, sw CAN, to n UT, and central CO, where rare [including *P. macroclada* Rydb.] *P. stenantha* Trin.
- Lemmas keeled or not; if keeled, lemmas to 4 mm long, rachilla internodes mostly less than 0.8 mm long, spikelets less than 5 mm long, panicles less than 7 cm long with branches less than 4 cm long, plants less than 3 dm tall 38
- 38(37). Lemmas keeled on back, pubescence mostly longer and stronger on keel and marginal nerves than between them, occasionally glabrous between them; plants mostly less than 30 cm tall, with few vegetative and many flowering shoots; callus glabrous; rachillas to 0.8 mm long; panicles strict, branches strictly ascending, strongly scabrous on prominent angles; leaf blades less than 3 cm long, strict, not thin and soft; foliage green or glaucous; ligules 1–2 mm long, truncate to obtuse, often minutely fringe margined; plants of high mountains on dry slopes and ridges *P. glauca* subsp. *rupicola* (see also couplet 19)
- Lemmas more or less rounded across back, crisp-puberulent all across base, pubescence usually not or little longer and stronger on nerves (except in *P. gracillema* form), infrequently nearly glabrous between nerves; callus glabrous or with a few hairs no longer than and not separated from those of lemma keel, or with hairs across top around base of lemma (different from those of surface of lemma); plants of various heights, with many vegetative shoots and few flowering shoots; rachilla (0.6) 0.8–1.9 mm long; panicles various, branches moderately scabrous, weakly angled; leaf blades of various lengths, lax, very thin, soft; foliage green or infrequently glaucous; ligule 2–7 mm long, acute to acuminate, margins entire or lacerate; plants of various habitats (forms of *P. secunda*, continue to couplet 39)
- 39(38). Plants mostly less than 4 dm tall; basal tuft of leaves fine, mostly less than 3 cm long and panicles contracted except in anthesis; plants of dry open ground at moderate elevations, flowering in early spring, sw CAN, to UT, and n CO *P. sandbergii* form
- Plants mostly over 4 dm tall; basal tuft of leaves mostly over 4 cm long, or panicles persistently open; plants of more mesic situations or higher elevations, flowering late spring to late summer 40
40. Panicles persistently open, lemmas evenly puberulent over base, or frequently with stronger pubescence on nerves than between them; plants of high mountains to alpine, sw CAN, south to n UT and CO *P. gracillema* form
- Panicles open only in anthesis, lemma pubescence fairly evenly developed over base; plants of various situations, widespread *P. canbyi* form

TAXA OF *POA* IN NEW MEXICO*Poa annua* L.

Poa annua L., Sp. Pl. 68. 1753. Annual Bluegrass.

Annual, slender, tufted. Culms erect or ascending, often geniculate at the nodes, 0.1–3+ dm tall. Leaves light green, soft, glabrous. Sheaths closed about $\frac{1}{2}$ the length. Ligules glabrous, entire, about as long as blade is wide. Blades mostly flat, soon withering, mostly 1–2 (4) mm wide, 1–8 cm long. Panicles 1–5 cm long, open, ovate or broader, branches smooth, strict, divergent, densely flowered in distal $\frac{1}{2}$. Spikelets 2–6-flowered, 2.5–6 mm long. Glumes narrow, unequal, the first often curved inward and $\frac{1}{2}$ – $\frac{2}{3}$ as long as adjacent lemma, second glume about $\frac{2}{3}$ – $\frac{3}{4}$ as long as adjacent lemma. Lemmas broadly lanceolate, smooth, prominently 5-nerved, villous on nerves (rarely nearly glabrous) and glabrous between. Callus glabrous, rachilla internodes glabrous and short. Paleas mostly villous on nerves, glabrous between. Flowers of lower florets perfect, terminal one reduced to nob on rachilla, or developed and then pistillate (gynomonecious). Anthers 0.3–1 mm long. Chromosome numbers: 24–26, 28, 52.

HABITAT: A common lawn weed, potential in every habitat in New Mexico so long as there is shade, winter moisture, and disturbance. Flowering continually in irrigated areas, otherwise primarily late winter–early spring.

DISTRIBUTION: Introduced from Europe. New Mexico: B, DA, OT, LN, RA, SD, and SF, but probably in every county.

COMMENT: This species is perhaps one of the world's most widespread weeds. It was present in Sitka, Alaska, by at least 1829, where collected and mixed with the type of *Poa leptocoma* Trin. Probably the first collection in New Mexico was made by S. M. Tracy in 1887 near Santa Fe.

Poa arachnifera Torr.

Poa arachnifera Torr., in Marcy, Expl. Red Riv. 301. 1853. Lectotype (A. Hitchc.): Marcy "crop timbers, Arkansas," in 1852 (NY). Texas Bluegrass.

Perennial from long, slender rhizomes. Culms tufted, erect, 2.5–8.5 dm tall. Leaves green, firm. Sheaths closed $\frac{1}{3}$ – $\frac{1}{2}$ the length,

keeled. Ligules 1–4 mm long, acute. Blades flat or folded, often inrolled on margins, 1.5–4.5 mm wide, elongate. Panicles oblong, contracted, somewhat lobed, 3–15 cm long, branches slender, strongly scabrous (female) to nearly glabrous (male), terminal ones densely flowered. Spikelets slightly dimorphic, compact, compressed; male 2–10-flowered, 4–8 mm long; female 2–5-flowered, 4–9 mm long. Glumes 1–5-nerved, smooth to scabrous, narrow, subequal. Lemmas 5–7-nerved, smooth to sparsely papillose-roughened; male 3.5–5 mm long, acute, sparsely villous to scabrous on keel, callus with several slender, long, villous hairs; female 4.2–6.4 mm long, with long hyaline, acute tips, densely villous on keel and marginal nerves, sometimes sparsely so on intermediate nerves, glabrous between nerves, callus with a copious tuft of long, plicate hairs. Paleas glabrous to sparsely long-ciliate (male) to villous (female). Rachillas glabrous, internodes less than 1 mm long. Flowers unisexual (dioecious, hermaphroditic flowers developed infrequently and then resembling the female ones). Anthers 1.6–2.7 mm long. Chromosome numbers: 42, ca 54, 56, ca 63, 84.

HABITAT: One record in New Mexico from Bosque del Apache (V), in salty flood plain, ca 1520 m, in 1957. Flowering May. Doubtfully native in New Mexico. One collection, *C. Wright* 2042 in 1851–1852 labeled as "New Mexico," belongs to this species, but where it was actually collected it is not known.

DISTRIBUTION: Apparently native to the south central Great Plains in Kansas, Oklahoma, Texas, Arkansas, but possibly introduced from South America in historical times. Introduced in all the southeastern states, but rare to the west. Seeded as a pasture and lawn grass in some areas.

COMMENT: *Poa arachnifera* is more similar to such South American dioecious species as *P. denudata* Steud., *P. bonarensis* (Lam.) Kunth., and *P. montevidensis* Arech. than to any other North American species.

Poa arctica R. Br.

Poa arctica R. Br., in suppl. App. Parry's Voy. 288 ("185"). 1823. TYPE: Parry Mellville Island, Arctic America.

Poa arctica subsp. *aperta* (Scribn. & Merr.),
comb. nov.

Poa arctica subsp. *aperta* (Scribn. & Merr.) comb. nov.:
Poa aperta Scribn. & Merr., USDA, Div. Agron. Circ. 35:4. 1901. TYPE: *Shear & Shear 98*, open mountainside, 2896 m elev., Telluride, Colo., 1 Sept. 1900 (US 28611600!, NY).

Perennial with rhizomatous. Culms wiry, decumbent, often densely tufted, smooth, 2–6 dm tall. Leaves greenish to glaucescent. Sheaths $\frac{1}{2}$ – $\frac{1}{3}$ open, rounded. Ligules 3–7 mm long, acute to attenuate, smooth. Blades ascending, strict, flat or folded, to 2.5 mm wide. Panicles erect, narrow to ovate, 4–15 cm long, few-flowered, branches strict and steeply ascending (or sharply divergent in anthesis). Axis internodes mostly 1–2 cm long, rarely over 3 cm long. Spikelets ovate, 2–3 (4) flowered, proportionally more green and less purple than typical *P. arctica*. Glumes large, lanceolate, the second broadly so, with broad-hyaline-margins, smooth, weak keel glabrous or very sparsely scabrous near tip, second glume subequaling first lemma in length. Lemmas 3.5–6 mm long, lanceolate, acute, obscurely 5-nerved, densely villous on keel and marginal nerves, abundantly short villose between nerves, this occasionally nearly restricted to intermediate nerves, pubescence occasionally uniformly and abundantly short villose over nerves and whole base of lemma. Callus glabrous to sparsely webbed. Paleas glabrous, sparsely scabrous, or abundantly villous on keels, glabrous to puberulent between them. Rachilla internodes glabrous, usually visible from side. Flowers perfect but anthers occasionally abortive. Anthers 1.4–2.5 mm long, yellow to purplish (aborted ones remaining yellow). Chromosome number: 99.

HABITAT: Spruce-fir forest to alpine meadows and grasslands, mostly 2440–3800 m. Flowering July–August. Occurring from deep, rich soils to rocky places, in somewhat drier and warmer situations than the other subspecies.

DISTRIBUTION: Southern Rocky Mountains in s Utah, s and c Colorado. New Mexico B, RA, SD, SM, TO.

COMMENT: This subspecies is a most distinctive race of *Poa arctica* s. lat. It is markedly different on first sight in its more tufted and stricter habit, with fewer sterile

shoots and proportionally more flowering shoots, more pale or glaucous foliage, and more southerly and often subalpine habitat. It may introgress with *Poa secunda*, but it shows strong affinity to *P. arctica* and grades into that species.

Poa arctica subsp. *grayana* (Vasey) Love,
Love & Kapoor

Poa arctica subsp. *grayana* (Vasey) Love, Love & Kapoor, Arctic & Alpine Res. 3:143. 1971; *Poa grayana* Vasey, Contr. U.S. Nat. Herb. 1:272, 1893. TYPE: *Patterson 14*, Grays Peak, Colorado, (US!). *Poa alpicola* Nash in Rydb., Mem. N.Y. Bot. Gard. 1:272. 1893. *Poa phoenicea* Rydb., Bull. Torr. Bot. Club 32:605, 1905. *Poa chionogenes* Gandog., Bull. Soc. Bot. France 66:302, 1920. *Poa longipila* Nash in Rydb., Mem. N.Y. Bot. Gard. 1:46. 1900. *Poa callichroa* Rydb., Bull. Torr. Bot. Club. 32:603, 1905. *Poa triclepis* Rydb., ibid., 606, 1905. Arctic Bluegrass.

Perennial, with well developed rhizomes. Culms usually decumbent, loosely tufted, smooth, 1–6 dm tall. Leaves green, firm. Sheaths closed $\frac{1}{4}$ to $\frac{1}{2}$ the length. Ligules 2–3 (4) mm long, truncate to acute, mostly entire. Blades flat or folded, 1–3 mm wide, those of culms less than 8 cm long, often curved upward. Panicles erect to nodding, ovate, 3.5–15 cm long. Branches 2–3 (5) per node, slender, often drooping or contorted, smooth to sparsely scabrous, bearing few spikelets toward tip. Axis internodes mostly 1–2 cm long, rarely over 3 cm long. Spikelets ovate, loosely, 2–6-flowered, 4–8 mm long, strongly purplish. Glumes large, lanceolate, second broadly so, with broad, purplish, hyaline margins, smooth, weak keel glabrous or very sparsely scabrous near tip, second glume subequaling first lemma in length. Lemmas (3) 4–6 mm long, 5-nerved, compressed-keeled, densely villous on keel and marginal nerves, mostly villous on intermediate nerves, mostly sparsely puberulent between nerves at base, mostly strongly purplish, bronze colored near tip. Callus glabrous or scantily webbed [subsp. *grayana* (s. str.)] to densely long-villous [*P. longipila* form]. Paleas glabrous, sparsely scabrous, or abundantly villous on keels, glabrous to puberulent between them. Rachilla internodes glabrous or villous. Flowers perfect but anthers occasionally abortive. Anthers 1.4–2.5 mm long, yellow to purplish (aborted ones

remaining yellow). Chromosome numbers 36–106, most frequently reported being 56 and 70.

HABITAT: Alpine. Occurring most frequently in cold, mesic sites, usually in peaty soils, 3100–3800 m in New Mexico. Flowering July–August.

DISTRIBUTION: The typical subspecies: Circumboreal, high arctic. Subspecies *grayana*: Cascade Mountains, and Canadian Rocky Mountains south to n New Mexico. CF, MR, RA, TO. *Poa longipila* is the most common form of subsp. *grayana* in the n Rocky Mountains and is known in the U.S. from as far south as s Colorado, where it is less common than the subspecies *grayana* in the strict sense.

COMMENT: Rocky Mountain phases of *Poa arctica*, based on the supposed larger stature of the plants, are often referred to *P. grayana*. However, population studies in Alaska and the Rocky Mountains do not support this distinction. Subspecies *grayana*, as originally proposed, is a heterogenous group and included all U.S. material of the species. However, many plants and populations from the Rocky Mountains match or lie between the more northern complex of the species. The complex requires a comprehensive study of population and herbarium material from its full geographic range.

Poa arida Vasey

Poa arida Vasey, Contr. U.S. Natl. Herb. 1:270. 1893.

TYPE: Vasey, Socorro, New Mexico, in 1881 (US, GH!). *Poa planifolia* Scribn. & Will. in Scribn. USDA Div. Agrostol. Circ. 9:3. 1899, not Kuntze, 1898; *Poa glaucifolia* Scribn. & Will., ibid. 10:6. 1899. TYPE: Williams 2814, moist banks, Spring Creek, Big Horn Basin, Washakie Co., Wyo., 4 Aug. 1897 (US). Plains Bluegrass.

Perennial with strong rhizomes. Culms round, 1.5–8 dm tall, not crowded, glabrous to scabrous, conspicuously striate. Leaves pale green, often glaucous, quite firm. Sheaths closed about $\frac{1}{6}$ the length, mostly glabrous. Ligules 1–4 mm long, acute, entire or lacerate. Blades 1–5 (mostly 2) mm broad, flat to folded, uppermost leaf usually 1–6 cm long. Panicles 4–12 (18) cm long, narrow and compact or infrequently open, branches more or less scabrous on sharp angles. Axis internodes 1–2 rarely over 3 cm long. Spikelets

(2) 3–7-flowered, 4–7 mm long, compact, ovate or longer. Glumes glabrous or more often sparsely scabrous on upper portion of keel, $\frac{2}{3}$ – $\frac{3}{4}$ as long as subtended lemmas. Lemmas 2.5–4 mm long, obtuse to acute, prominently 5-nerved, often weakly keeled, densely pubescent on keel and marginal nerves and usually also on intermediate nerves, densely short-villous between nerves to glabrous. Callus glabrous. Rachilla usually pubescent. Paleas villous to long scabrous on keels. Flowers perfect. Anthers 1.3–1.7 (2+) mm long. Chromosome numbers: 63, 64, 76, 84, 90, 103, (*P. glaucifolia* form: 50, 56, 70, 81, 84, 86, ca 100).

HABITAT: In New Mexico, *P. arida* is the only native perennial bluegrass on the open plains and alkaline or saline flood plains, 1070–1980 m. Flowering May–July.

DISTRIBUTION: Western Great Plains Canada south to New Mexico; B, CV, G, MR, SC, SM, U, V. The several Utah records of this species I have seen are all alpine and are referable to *Poa arctica* subsp. *aperta*. The Arizona records of this species have been based on rhizomatous specimens of *Poa fendleriana*.

COMMENT: *Poa glaucifolia* appears to be a shade or mesic form having more lush foliage, smaller, more numerous, less pubescent spikelets, and larger, more open panicles. *Poa arida* shows some affinity to the *P. secunda* complex and appears to hybridize with it where ranges overlap. This species may have evolved from Pleistocene hybridization between species of section *Poa* and the "Secundae" group.

Poa bigelovii Vasey & Scribn.

Poa bigelovii Vasey & Scribn., in Grasses U.S. Descr. Cat. 81. 1885, *nomen nudum*; Vasey & Scribn. in Vasey, Contr. U.S. Natl. Herb. 1:270. 1893. TYPE: Fendler 931, New Mexico [probably along Santa Fe Cr. above Santa Fe], in 1847. *Poa annua* var. *stricta* Vasey, Bull. Torrey Bot. Club 10:31. 1883. Bigelow Bluegrass.

Erect, loosely tufted annuals (rarely biennial). Culms sometimes geniculate at base, leafy, 1–6 dm tall. Leaves bright green, mostly cauline. Sheaths sharply keeled, closed ca $\frac{1}{4}$ – $\frac{1}{2}$ the length. Ligules 1–6 mm long, acute, entire, glabrous to scabrous on back. Blades 1.5–5 mm broad, flat or folded, promi-

nently keeled and prow tipped. Panicles very narrow, elongate, internodes frequently over 4 cm long. Branches appressed, often flowered from base, scabrous. Spikelets crowded on branches, compact, 4–7 mm long, ovate, strongly compressed. Glumes narrow, tending to curve inward, first subequal to second, scabrous on 1–3 nerves, with narrow hyaline margins. Lemmas broadly lanceolate, acute to blunt, with whitish hyaline margins, 3–5 mm long, 5-nerved, intermediate usually distinct, villous on keel and marginal nerves and sometimes on midnerves, finely papillose-roughened glabrous or puberulent between nerves on lower $\frac{1}{2}$. Callus with tuft of long hairs. Paleas mostly sparsely short villous on keels (at least near middle) and scabrous above, papillose between nerves. Rachilla internodes glabrous, slender, short, and hidden from side view. Flowers perfect, mostly cleistogamous. Anthers 0.2–1 mm long. Chromosome numbers: 28, 28+1.

HABITAT: Frequent to locally abundant in warm deserts to ponderosa pine zone, sporadic northward and upward. In shade of rocks and shrubs and in arroyo bottoms 1070–2900 m in New Mexico. Flowering March–May.

DISTRIBUTION: Southwestern U.S., Oklahoma, s Colorado, s Utah, s Nevada, to California, Arizona, south to Texas, Baja California, and c Mexico. New Mexico: CB, DA, ED, CT, HD, LU, LN, MK, MR, OT, RA, SC, SD, SF, SM, TO, TR.

COMMENT: Although considered by most authors to be close to *Poa annua*, *P. bigelovii* is more closely related to *P. occidentalis*.

Poa bulbosa L.

Poa bulbosa L., Sp. Pl. 70, 1753. Bulbous Bluegrass.

Perennial, densely tufted. Culms 0.5–6 dm tall, somewhat bulbous at base. Leaves green. Sheaths round, usually smooth, closed only at base, lower ones often reddish, basal ones fibrous. Ligules 2–3.5 mm long, glabrous, obtuse, entire or lacerate. Blades near base of plant soft and filiform, those of culm 1–2 mm wide. Panicles lax, broadly lanceolate, up to 10 cm long. Spikelets usually with few "normal" florets beneath terminal, mostly bulbiferous ("viviparous") florets, compressed. Glumes mostly normal, sparsely

scabrous on keel. Lemmas of normal florets strongly keeled, glabrous to sparsely villous on keel and marginal nerves, minutely papillose-roughened between nerves, with or without a sparse web on callus. Paleas sparsely scabrous on keels. Flowers at base of spikelet usually perfect but often incompletely developed, the upper producing bulbous vegetative offsets. Anthers 1.2–1.5 mm long, questionably functional. Chromosome numbers: 14, 21, 28, 39, 40, 42, 45, 56, 58.

HABITAT: The few collections to date (1936 and 1938) from New Mexico have been from grassland communities. It is likely to have spread into ponderosa pine zone of northern New Mexico as well, 1830–1980 m. Flowering April–September.

DISTRIBUTION: Introduced from Europe, widespread in w North America. New Mexico: MK, RA, SJ.

Poa compressa L.

Poa compressa L., Sp. Pl. 69, 1753. Canada Bluegrass.

Perennial, strongly rhizomatous, frequently sod forming (reportedly caespitose in one strain, but this not known from New Mexico). Culms slender to very stout, flattened, often geniculate at the nodes, nodes strongly flattened. 20–60 cm tall, lower internodes usually shorter than sheaths. Leaves green, firm. Sheaths flattened, closed from only near base up to $\frac{1}{4}$ the length. Ligules 1–3 mm long, mostly obtuse, jagged, ciliate fringed on margin, mostly glabrous on back. Blades of culm mostly regularly divergent, 1.5–4 mm broad, 2–10 cm long flat or folded, upper-one fixed well above middle of culm. Panicles mostly erect, contracted, 2–10 (15) cm long. Branches short, mostly less than 3.5 cm long, mostly steeply ascending (to widely spreading in anthesis), strongly scabrous on prominent angles. Axis internodes mostly less than 3 cm long. Spikelets strongly compressed, 2.5–8 mm long. Glumes mostly $\frac{1}{2}$ – $\frac{2}{3}$ as long as adjacent lemmas, mostly 3-nerved, scabrous on keel in upper part. Lemmas broadly-acute to blunt, hyaline-tipped, strongly 5-nerved, villous on keel and marginal nerve, glabrous between nerves and distinctly finely papillose-roughened. Callus mostly with short web, sometimes glabrous. Paleas scabrous on keels, glabrous between. Rachillas short,

glabrous. Flowers perfect. Anthers 1.3–1.8 mm long. Chromosome numbers: 14, 35, 39, 42, 45, 49–50, 56, 84.

HABITAT: Open ground, roadsides, disturbed meadows, often in riparian areas, in forested habitats, 1520–3050 m in New Mexico. Flowering June–August.

DISTRIBUTION: Introduced from Europe, widespread in North America. New Mexico CF, CT, HR, LN, MK, OT, RA, SD, SF, SM, TO, TR.

COMMENT: Frequently confused with *Poa pratensis*, but the latter has more closed, weakly keeled sheaths and terete culms.

Poa fendleriana (Steud.) Vasey

Poa fendleriana
subsp. *fendleriana*

Poa fendleriana (Steud.) Vasey subsp. *fendleriana*. USDA Div. Bot. Bull. 13(2):pl. 74. 1893; *Eragrostis fendleriana* Steud., Syn. Pl. Glum. 1:278. 1854. LECTOTYPE (Marsh): Fendler 932 "Mexico" [New Mexico, probably in Santa Fe Canyon above Santa Fe.], in 1847 (NY!), plant no. 1 of that sheet; ISOTYPES: NY!, GH!, GH!. Fendler Muttgrass.

Perennial, tufted, usually producing short rhizomes (these infrequently collected). Culms mostly slender to stout, (15) 25–45 (60) cm tall (male), (15) 30–60 (80) cm tall (female). Leaves green, infrequently bluish, quite firm, mostly basal, basal tuft 2–40 cm tall. Sheaths closed ca $\frac{1}{3}$ the length, strongly striate, more or less coarsely spiculate about collar near sheath margins, mostly puberulent or finely scaberulous (if glabrous or sparsely scabrous, then lemmas quite villous on keel nerve). Ligules from merely spiculate ridge to 1 (2) mm long, truncate to rounded, spiculate fringed on upper margin and abundantly scabrous on back. Blades (0.5) 0.8–2 (3) mm wide, thick, firm, mostly scabrous to puberulent ventrally, flat or folded, occasionally with margins inrolled, within a plant upper blade of at least some culms 0–3 mm long, others occasionally exceeding 1 (4.5) cm in length. Panicles narrowly oblong, compact (more open in flower), branches scabrous, often flowered from base, spikelets loosely arranged on short pedicels, sexually dimorphic, 2–6 (9) cm long in males, (3) 4–8 (12) cm long in females. Axis internodes mostly less than 2.2 (3) cm long. Spikelets ovate, somewhat plump, 3–10 mm long, 2–7-flowered, mostly shiny, and pale

green, sometimes turning purplish, ca 15–60 per panicle. Glumes lanceolate to broadly so, 1–3-nerved, mostly glabrous and shining. Lemmas 3–6 mm long, smooth to papillose-roughened, 5-nerved, intermediate nerve often obscure, prominently long-villous on keel and marginal nerves and glabrous between them (1% of New Mexico specimens sparsely villous on intermediate nerves as well). Callus glabrous or with hairs no longer than those on rachilla internodes. Paleas roughened, scabrous to villous on keels and between them. Rachillas less than 1.3 mm long, glabrous to scabrous, infrequently pubescent. Flowers unisexual, (dioecious). Anthers 1.5–3 mm long. Chromosome number: 56.

HABITAT: Rocky slopes and meadows, upper desert-grasslands, interior chaparral to subalpine grasslands, frequent in ponderosa pine–gambel oak associations, 1220–3350 m. Flowering February–June (October). One of most abundant early spring flowering species in New Mexico.

DISTRIBUTION: Southern Montana south to n Mexico, w Utah, Arizona, Wyoming, South Dakota, Colorado, Oklahoma, Texas, Coahuila, Chihuahua, New Mexico DA, B, CB, CF, CT, GR, HD, LA, LN, LU, MK, MR, OT, RA, SC, SD, SF, SM, SR, TO, TR, U.

COMMENT: This subspecies appears to be restricted to areas under the influence of summer monsoons. As averaged over the range, approximately 15% of the specimens are male plants, these originating predominantly from New Mexico, Arizona, and Texas. Intermediate sexual populations between this and subsp. *longiligula* occur where the sexual races of each subspecies are geographically in contact. Many of the plants from outside the sexual zones exhibit intermediate characteristics as well, but most tend strongly toward one or the other sexual race in morphology and ecology.

Poa fendleriana subsp. *albescens* (Hitchc.),
comb. nov.

Poa fendleriana subsp. *albescens* (Hitchc.), comb. nov.;
Poa albescens Hitchc., Contr. U.S. Nat. Herb. 17(3):375. 1913. HOLOTYPE: *Rose 11648*, Mexico, Chihuahua, Minaca, 1 Apr 1908. (US 454361!).
Poa griffithsii Hitchc., Contr. U.S. Nat. Herb. 17(3):375. 1913. HOLOTYPE: *Griffiths 4865*, Mex-

ico, Sonora, Cananea, 7-8 Jul 1907, (US 691228! (an aberrant specimen, tending to be bulbiferous)). Mexican Muttongrass.

Similar to *Poa fendleriana* subsp. *fendleriana*. Culms slender to stout, 20-60 cm tall. Leaves mostly basal, green. Sheaths glabrous to rarely strongly scabrous, collars spiculate near leaf margins. Ligules from nearly absent to 1.8 mm long, truncate to rounded, spiculate-fringed on margin, scabrous on back. Blades flat or folded, sometimes inrolled on margins. 1-2.5 (3.5) mm wide, uppermost blade 0-6 (12) mm long. Panicles (3) 4-12 (20) cm long, branches scabrous. Axis internodes 1-3 cm long. Lemmas glabrous to sparsely puberulous on keel, sometimes sparsely scabrous on upper keel, marginal nerves usually obscurely and regularly short ciliate, glabrous between nerves. Paleas glabrous between keels. Rachillas glabrous. Flowers unisexual (dioecious; primarily sexual but asexual populations known). Anthers 1.5-3 mm long. Chromosome number: 28+1.

HABITAT: Pine-oak to spruce forests and subalpine grasslands, in rocky, organic soils and steep meadows, 1680-3350 m.

DISTRIBUTION: Sierra Madre Occidental Mexico in w and Chihuahua, ne Sonora, in the U.S. in the mountains of se Arizona and sw New Mexico: HD.

COMMENT: *Poa albescens* and *P. griffithsii*, each described from single specimens, differ only in minor ways. Since their publication, an array of specimens have been collected that are intermediate and serve to bridge the main differences between them. The lemmas of plants of *P. f.* subsp. *albescens* are mostly glabrous or very sparsely pubescent, and the sheaths are mostly glabrous. Other than in the characters mentioned above, subspecies *albescens* stands only slightly morphologically removed from the typical subspecies, yet it is cytologically distinct. The proposed subspecies is restricted to the Sierra Madre Occidental. This taxon intergrades to subsp. *fendleriana* where the two occur together, but very few intermediate staminate specimens have been discovered.

Poa fendleriana subsp. *longiligula*
(Scribn. & Will.), comb. nov.

Poa fendleriana subsp. *longiligula* (Scribn. & Will.),
comb. nov.; *Poa longiligula* Scribn. & Will.,

USDA Div. Agrost. Circ. 9:3, 1899. HOLOTYPE: Jones 5149, Silver Reef, Washington Co., Utah, 3 May 1894 (US 28539100!). ISOTYPES: MO!, OSC!; *Poa fendleriana* var. *longiligula* (Scribn. & Will.) Gould, Madrono 10:94, 1949. Longtongue Muttongrass.

Perennial, tufted, sometimes stooling, but less evidently rhizomatous, and generally more robust than typical subspecies. Leaves firmer, pale green to somewhat bluish. Sheaths glabrous to scabrous or infrequently puberulent, but hairs not noticeably coarser and congested around collar margins. Ligules obtuse to acuminate, entire or only very faintly scabrous on margin, glabrous to sparsely scabrous on back, (1.5) 2-18 mm long. Blades somewhat broader than in typical subsp., (0.8) 1.5-2.2 (4) mm wide, flat or folded, rarely inrolled on margins, glabrous, scabrous, or puberulent ventrally, upper culm blade of some culms reduced to 4 mm long or less, longest ones to 2 (7.8) cm long. Panicles slightly dimorphic, (2) 3-8 (10) cm (males), (2) 5-12 (30) cm long (females). Axis internodes to over 4 cm long. Spikelets 2-13-flowered, 4-12 mm long, pale green, shiny. Lemmas 5-nerved, intermediate nerves obscure to prominent, prominently long villous on keel and marginal nerves, glabrous or sparsely villous on intermediate nerves, glabrous or occasionally puberulent between nerves. Rachillas hirtellous to puberulent. Flowers unisexual, (dioecious, infrequently perfect in part). Anthers 1.5-3.8 mm long. Chromosome numbers: 56.

HABITAT: From interior chaparral and pinyon-juniper to subalpine meadows, often in somewhat dryer situations than typical subsp., 1830-2440 m in New Mexico, 910-3510 m elsewhere. Flowering March-July.

DISTRIBUTION: Mexico in Baja California, California, Oregon, Idaho, Nevada, Oregon (almost exclusive of subsp. *fendleriana*), sw Canada in British Columbia, Arizona, Colorado, Montana, South Dakota, Utah, Wyoming (where occasionally intermediate to subsp. *fendleriana*). Northwest New Mexico: B, CB, MK, SC, SD, SJ, TO.

COMMENT: This subspecies is predominantly distributed west of the summer monsoon region. Agamospermy is the predominant mode of reproduction in this subspecies, but staminate plants are frequent in Arizona,

Utah, and s California and Nevada. Only one staminate plant has been collected in New Mexico. In contrast to subsp. *fendleriana*, about half the plants of subsp. *longiligula* exhibit pubescent lemma intermediate nerves. None of the New Mexico material of the species has pubescence between the lemma nerves, but to the north and west some plants of subsp. *longiligula* are hairy in this region.

Poa glauca Vahl.
Poa glauca subsp. *glauca*

Poa glauca Vahl subsp. *glauca*, Fl. Dan. fasc. 17:3. Pl. 964. 1790. TYPE: Norway. Glaucous Bluegrass (Timberline Bluegrass).

Perennial, caespitose, most shoots flowering. Culms mostly 1–3+ dm tall, strict, stout, wiry, mostly ascending, glabrous or rarely sparsely scabrous about the nodes. Leaves glaucous, few on culm. Sheaths rounded or slightly keeled, closed from near base up to $\frac{1}{4}$ the length. Ligules 0.5–3+ mm long, short-truncate to obtuse, upper edge entire to erose, often minutely fringed, sparsely to strongly scabrous on back. Blades 1–2.5 mm broad, firm, upper one located below middle of culm, 1–5 (6) cm long. Panicles 1.5–7 (12), open or closed, ovate to lanceolate, branches strict and steeply ascending, to 3+ cm long, mostly strongly scabrous on angles, and with a few flowers near tips. Axis internodes rarely over 2 cm long (in Rocky Mountains). Spikelets compressed, ovate, glaucous, often somewhat purplish, 2–3 (5)-flowered, 2–5 (7) mm long. Glumes mostly 3-nerved, subequal, mostly sparsely scabrous on nerves and frequently between them, the second mostly with margin distinctly angled or rounded near middle, $\frac{3}{4}$ – $\frac{7}{8}$ as long as first lemma. Lemmas 2–4 mm long, distinctly 5-nerved, papillose-roughened to nearly smooth, glabrous to sparsely puberulent between nerves, villous on keel and marginal nerves and frequently also on intermediate ones, hyaline margin narrow, obtuse, and frequently blunt at tip. Callus with distinct tuft of hairs up to $\frac{1}{2}$ as long as lemma. Paleas scabrous or infrequently glabrous on keels, papillose, scabrous, or puberulent between keels, usually short spiculate between keels. Rachillas glabrous, scabrous, or puberulent. Flowers all perfect but frequently anthers infertile. Anthers

1.4–2 mm long. Chromosome numbers: 42, 44, 56–58, 62–63, 70–72, 75, 78.

HABITAT: Subalpine to alpine, meadows, rocks, exposed ridges, wind balds, from open ground to among densely thatched cushion plants, 3350–3960 m in New Mexico. Flowering July–August.

DISTRIBUTION: Circumpolar boreal. *Poa glauca* subsp. *glauca* is found in most of tiagatundra, subalpine, and alpine regions of Canada but is infrequent southward in U.S. Rocky Mountains, occurring south to south central New Mexico: LN, OT, RA, SF, TO.

COMMENT: *Poa glauca* subsp. *glauca* is less frequent than subsp. *rupicola* in the U.S. Rocky Mountains. The latter may be distinguished by its smaller, more slender, and erect culms, greener foliage, and the presence of pubescence between the lemma nerves, and callus with a minute web or glabrous. The transition between the forms is highly complex. In population samples of "*P. rupicola*" from the Rocky Mountains, it is common to find the extremes of *P. glauca* and *P. interior*, and all intermediate combinations of habit, coloration, and spikelet pubescence. However, subsp. *rupicola* occasionally forms monomorphic populations, and in some regions of the west, such as in the Sierra Nevada, this is the only form present. In transplant studies with Rocky Mountain alpine material, identified in the field as "*P. rupicola*," glaucousness or greenness, spikelet pubescence, shape of spikelet parts, and general leafiness were stable characters. Stature and panicle dimensions tended to be more plastic.

Western U.S. *Poa glauca* (s. lat.) is part of an extremely variable agamic complex. It often occurs with, and shows forms intermediate to, *P. secunda*, but in most cases may be distinguished as keyed.

Poa glauca subsp. *rupicola* (Nash)
W. A. Weber

Poa glauca subsp. *rupicola* (Nash) W. A. Weber, Phytologia 51:375. 1982; *Poa rupicola* Nash, Bull. Torrey Bot. Club 14:94. 1887. LECTOTYPE (A. Hitchc.): Wolf 341, South Park, Colorado, in 1873 (NY!); *Poa rupestris* Vasey, not Roth 1817, not Bieb 1831, not With. 1796; *Poa glauca* var. *rupicola* B. Boivin, Naturaliste Canad. 94:527. 1967. Timberline Bluegrass.

Similar to subspecies *glauca*, but varying as follows: Culms more slender and erect, mostly 0.5–1.5 (2.5) dm tall. Leaves green to somewhat glaucous, few on culm. Blades 1–2 mm wide, firm, upper-one usually located below middle of culm and 1–3 (4) cm long. Panicles 1.5–5 cm long, open or closed, ovate to lanceolate, branches more slender. Axis internodes to 2 cm long. Spikelets more compact, usually somewhat glaucous, often reddish or purplish, 2–3 (4) flowered, 2–5 mm long. Glumes mostly sparsely scabrous on nerves and frequently between them, both broad, mostly 3-nerved, subequal, the second mostly with margin distinctly angled or rounded near middle. Lemmas 2–3.5 mm long, distinctly papillose-roughened, villous on keel and marginal nerves and often on intermediate nerves, usually puberulent between nerves, acute to obtuse and sharp or blunt at tip. Callus with tiny tuft of crinkled hairs or glabrous. Anthers 1.1–1.6 mm long. Chromosome numbers: 48–50, 54–56.

HABITAT: Subalpine to alpine, meadows, rocks, exposed ridges, wind balds, from open ground to among densely thatched cushion-plants, 3350–3960 m in New Mexico. Flowering July–August.

DISTRIBUTION: Alpine regions of Western North America. Generally replacing typical subspecies throughout western U.S. Canada in Alberta and British Columbia, south to alpine of California, northern Arizona, and south central New Mexico: LN, OT, RA, SF, TO.

COMMENT: This race occurs to the exclusion of subsp. *glauca* and *P. interior* in the Pacific cordillera. However, see comments under those taxa.

Poa interior Rydb.

Poa interior Rydb., Bull. Torrey Bot. Club 32:604. 1905.

TYPE: *Tweedy* 3706, Headwaters of Clear Cr. and the Crazy Woman Rv. Wyoming, in 1900 (NY!); *Poa nemoralis* var. *interior* (Rydb.) Butt. & Abbe; *Poa nemoralis* subsp. *interior* (Rydb.) W. A. Weber, Phytologia 51:375. 1982. Inland Bluegrass.

Perennial, cespitose, most shoots fertile. Culms 0.5–5 dm tall, densely tufted at base, slender, wiry, frequently geniculate at lower nodes, more or less glabrous about nodes. Leaves green, sometimes reddish, usually several on the culm. Sheaths as in *P. glauca*.

Ligules truncate to rounded, to 2 mm long, mostly scabrous on back, upper margin frequently jagged, mostly minutely fringed. Blades 1–2.5 mm wide, strictly ascending to divergent at about 60°, sometimes lax, upper one (3) 6–15 cm long. Panicles strict or somewhat lax, 2–15 cm long, the 1–3 (4) branches prominently scabrous on distinct angles, slender, ascending, to 6 cm long. Axis internodes to 4 cm long. Spikelets 2–3-flowered, 2.5–5 mm long, compressed, ovate, mostly bright green, sometimes purplish. Glumes narrow to broad, mostly 3-nerved, scabrous on keel, tips sharply acute, usually abruptly curved in or outward at apex, second glume mostly with distinct to rounded angle near middle of margin. Lemmas 5-nerved (intermediate nerves frequently obscure), prominently villous on keel (to near tip) and marginal nerves, only occasionally villous on intermediate nerves (then sparsely so), glabrous and papillos-roughened between nerves. Callus web minute, or to about $\frac{1}{2}$ lemma in length. Paleas scabrous to occasionally glabrous on keels. Rachillas as in *P. glauca*. Flowers perfect. Anthers 1.1–1.8 mm long. Chromosome numbers: 28, 42, 43, 56.

HABITAT: In Douglas-fir and spruce-fir forests in moist meadows, on mossy ledges, to alpine meadows and wind balds, 2740–3660 m in New Mexico. Flowering July–August.

DISTRIBUTION: Interior w North America extending to the Great Lakes region, north to Alaska, south to Arizona (reported from, but doubtfully in, Texas) and New Mexico: B, CB, CF, RA, SD, SM, TO.

COMMENT: Frequently intergradient with and difficult to distinguish in forest and meadow habitats from *Poa palustris*, to thoroughly intergradient with populations of *Poa glauca* Vahl at higher elevations. A close relationship to the introduced *P. nemoralis* L. is evident, but the forms of *P. interior* in the western United States more closely approach *P. glauca*. A thorough, worldwide study of population samples from this facultatively agamosperous complex is sorely needed.

Poa leptocoma Trin.

Poa leptocoma Trin., Mem. Acad. St. Petersb. VI, 1:374. 1830. HOLOTYPE: *D. Mertens* Sitka, Alaska (LE!). Bog Bluegrass.

Perennial, loosely tufted or somewhat rhizomatous in mossy habitats. Culms 2–10 dm tall, smooth or scabrous. Leaves bright green. Sheaths closed $\frac{1}{4}$ – $\frac{1}{2}$ the length, smooth or scabrous. Ligules 1.5–4 mm long, truncate to obtuse, entire to jagged, glabrous on back. Blades flat or folded, mostly lax, 1–4 mm wide, upper (5) mostly 8–15 cm long (in U.S. Rocky Mountains). Panicles nodding, lax, open, the 1–3 (mostly 2) branches per node capillary, scabrous, spreading to occasionally strongly reflexed, few- to many-flowered in distal $\frac{1}{3}$. Axis internodes mostly less than 4 cm long. Spikelets green to strongly purplish, strongly compressed, narrowly ovate to oblong, loosely 2–5-flowered, 4–8 mm long. Glumes sharply acute, mostly scabrous on nerves, unequal, the first shortest, very narrow, 1-nerved, the second lanceolate, 1–3-nerved. Lemmas 5-nerved, intermediate nerves mostly obscure, very smooth and glabrous between nerves, densely to sparsely villous on lower $\frac{2}{3}$ of keel and marginal nerves (to nearly glabrous), hyaline margin prominently bronze colored near tip (unlike *P. occidentalis*). Callus with a sparse, long web. Paleas keels with regularly spaced, slender, antorsely curved scabers, or nearly glabrous, with only long cells between the nerves. Rachillas elongate, usually visible from side-view at maturity. Flowers perfect, mostly cleistogamous. Anthers 0.25–1 (1.1) mm long. Chromosome numbers: 42.

HABITAT: Subalpine and alpine, in wet meadows, along stream banks, springs, and bogs, 2200–3350 m in New Mexico. Flowering June–August, generally slightly later than the very similar, and frequently sympatric, *P. reflexa*.

DISTRIBUTION: Northeast Asia, boreal w North America to the Canadian Rocky Mountains (*P. paucispicula* Scribn. & Merr.), se Alaska south and east through high montane and alpine regions of w North America to s New Mexico (*P. leptocoma*). New Mexico: CB, CF, LN, OT, SF, TO.

COMMENT: This species and *Poa reflexa* often occur together in mixed stands, and the species are sometimes considered as varieties. However, the species have different chromosome numbers, and intermediate plants are rare. The morphological distinctions, once recognized, make them easy to

distinguish and indicate that they may be only distantly related (see subgeneric placement above).

Poa nervosa (Hook.) Vasey

Poa nervosa (Hook.) Vasey, Bull. U.S. Depr. Agr. Div. Bot. 132:pl. 81. 1893; *Festuca nervosa* Hook. Fl. Bor. Am. 2:251, pl. 232. 1840. TYPE: *Scouler*, Nootka Sound, Vancouver Isl., British Columbia (NY!, GH!, US!).

Poa nervosa var. *wheeleri* (Vasey)

C. L. Hitchc.

Poa nervosa var. *wheeleri* (Vasey) C. L. Hitchc. Vascl. Pl. Pac. Northwest. 1:671. 1969; *Poa wheeleri* Vasey in Rothr. Cat. Pl. Surv. W. 100th Merid. 55. 1874. TYPE: *Wolf 1131*, South Park, Colorado (US!). *Poa curta* Rydb. (non auct.) Bull. Torr. Bot. Club 36:534. 1901. TYPE: *Tweedy 13*, Spread Creek, Teton Co., Wyoming (NY!).

Perennial, loosely tufted, with prominent short rhizomes. Culms erect, often decumbent at base, terete, 20–85 cm tall. Leaves light green. Sheaths prominently striate, round to weakly keeled, closed ($\frac{1}{2}$) $\frac{1}{2}$ to nearly entire length, at least those of lower culm usually finely retrorsely scabrous-puberulent, infrequently glabrous throughout. Ligules 1–3 (4) mm long, truncate to acute (above), usually densely spiculate on back (especially below). Blades flat to folded, weakly keeled, soft, steeply ascending, glabrous to sparsely spiculate above, glabrous below, those of culm 1.5–3 mm broad, and to 10 cm long, upper culm one 1–6 cm long, those of innovations to 30 cm long. Panicles erect, nodding at tip, (3.5) 5–13 (18) cm long, narrowly ovoid, sparsely flowered, long-peduncled. Branches spreading to ascending, scabrous on angles, (1) 2–4 per node, with (1) 3–8 (11) spikelets in distal $\frac{1}{2}$. Axial internodes mostly 1–3.5 cm long. Spikelets compressed, 5–11 mm long, 2–8-flowered, light green to somewhat purplish. Glumes about $\frac{2}{3}$ the length of subtended lemma, acute, keels distinct, sparsely scabrous above. Lemmas, keeled, 4–6 mm long, broadly acute, papillose-roughened to sparsely spiculate between nerves, frequently scabrous above, 5-nerved, often scabrous on nerves, occasionally puberulent on keel and marginal nerves. Callus glabrous. Paleas moderately to sparsely scabrous along keels, sparsely spiculate between keels. Rachilla in-

ternodes usually spiculate. Flowers pistillate or infrequently appearing hermaphroditic (in var. *wheeleri*), (dioecious or gynodioecious and sexually reproducing in the typical variety, reproduction by agamospermy in var. *wheeleri*). Anthers to 3 mm long, usually vestigial in var. *wheeleri*. Chromosome numbers: 28, 29, 56, 61–64, 70, 74, 91.

HABITAT: Open mountain slopes from upper sagebrush and lower pine belts to lower alpine (New Mexico subalpine), in rich soils and duff. The one New Mexico collection from 3500 m. Flowering (May) June–August.

DISTRIBUTION: Southwestern Canada, Pacific Northwest, south to California, and Nevada. In Rocky Mountains south to north central New Mexico: TO.

COMMENT: *Poa nervosa* (sensu stricto), applies to the sexually reproducing race found west of the Cascade Mountains in the Pacific Northwest. It is distinguished by the presence of long hairs on the collar margins. Variety *wheeleri* is one of the most common native *Poas* of the northern Rocky Mountains and, although highly variable in form, is distinguishable by its puberulent lower sheaths and ligules, relatively uniformly developed upper culm leaves, and pistillate florets. However, the one New Mexico collection (Gold Hill) has glabrous sheaths, only sparsely puberulent ligules, and pubescent lemmas. The complex needs further evaluation.

Poa occidentalis Vasey

Poa occidentalis Vasey, Contr. U.S. Natl. Herb. 1:274. 1893. HOLOTYPE: Vasey, Las Vegas, New Mexico, in 1881 (US 28537500!); *Poa platyphylla* Rydb. New Mexico Bluegrass.

Perennial, loosely tufted, probably short-lived. Culms stout, erect or decumbent, reddish at base, erect, 2–11 dm tall. Leaves mostly cauline, commonly blue-green. Sheaths longer than internodes, closed $\frac{1}{4}$ – $\frac{1}{2}$ the length, strongly keeled, glabrous or mostly abundantly retrorsely scabrous, lower ones often reddish. Ligules acute to acuminate, entire, scabrous on back, those of upper culm leaves to 12 mm long, mostly longer than leaf is wide. Blades strongly keeled, tip distinctly prow shaped, upper 4–18 cm long, 1.2–5.5 (10) mm wide. Panicles open, pyramidal, elongate, (6) 12–40 cm long, with loosely ascending branches when young, erect and with

widely spreading branches at maturity, tips drooping. Branches 5–23 cm long, densely flowered in distal $\frac{1}{2}$, moderately to sparsely scabrous. Axis internodes mostly over 4 cm long. Spikelets oblong, strongly compressed, 3–8 mm long, usually longer than pedicel, 2–7-flowered. Glumes subequal, sharply acute, the first narrowly lanceolate, 1-nerved, the second broader, 1–3-nerved, nearly equaling first lemma in length. Lemmas usually green with whitish hyaline margin and tip, sometimes purplish but rarely bronze colored at tip (unlike *P. leptocoma*), 2.6–4.2 mm long, usually distinctly 5-nerved, keel scarcely incurved at tip, villous on lower $\frac{1}{2}$ of keel and lower $\frac{1}{3}$ of marginal nerves, glabrous to sparsely puberulent between them. Callus with sparse long web. Paleas glabrous to finely scabrous on keels, with long and short cells between keels. Rachilla internodes glabrous, usually hidden from side view. Flowers perfect, mostly cleistogamous. Anthers 0.3–1.0 mm long. Chromosome numbers: 14, ca 28.

HABITAT: Montane. Usually in mesic situations, on cool exposures, in sparsely vegetated, disturbed, and natural forest openings, 2300–3500 m. Flowering mid-July–September.

DISTRIBUTION: Southwestern Colorado, White Mountains of e Arizona, to the Guadalupe Mountains of Texas. New Mexico: B, CB, CF, GR, LN, OT, RA, SD, SF, SM, SR, TO. Past, more northerly reports of this species (including Utah and Wyoming) have been in error. *Poa occidentalis*, sensu Harrington, 1954, is mostly *P. tracyi*.

Poa palustris L.

Poa palustris L., Syst. Nat. 10th ed. 2:874. 1759. Fowl Bluegrass.

Perennial, most shoots fertile. Culms loosely tufted, often decumbent at base and rooting at nodes, stoloniferous, stout, more or less scabrous below nodes, loosely tufted, 2–12 dm tall, often branching above base. Leaves green, often turning reddish, mostly cauline and numerous. Sheaths keeled, usually closed less than $\frac{1}{4}$ the length, mostly glabrous. Ligules 2–6 mm long, rounded to acute, mostly fringed on margin, entire or jagged, often scabrous on back. Blades 1–4 mm wide, flat or folded, those of culm steeply

ascending, longer ones drooping, uppermost one fixed well above middle of culm, 5–20 cm long. Panicles open, (narrow and congested when young), elongate, broad, densely flowered, mostly 10–30+ cm long. Branches mostly 4 or more per node, usually 2 or 3 times rebranched, capillary, and spreading, scabrous on the angles. Axis internodes mostly over 3 cm, to 6 cm long. Spikelets compressed, smallish, 1–6 (mostly 2–4) flowered, 2–4 mm long. Glumes subequal, about $\frac{7}{8}$ as long as the subtended lemma, narrow, broadest near middle, scabrous on keel, second glume margin mostly gradually rounded. Lemmas 2–2.7 mm long, 5-nerved (intermediate nerves mostly obscure) villous on keel and marginal nerves, glabrous and finely papillose-roughened between nerves, tip distinctly incurved, broadly acute, obtuse, or blunt, prominently bronze colored, hyaline margin very narrow. Callus with sparse but prominent web. Paleas scabrous to minutely ciliate on keels. Rachillas glabrous or scabrous. Flowers perfect. Anthers 0.8–1.4 mm long. Chromosome numbers: 28, 30, 32, 42.

HABITAT: Montane. Mixed-conifer forests from riparian, where often in shallow water, to moist meadows and open ground, ca 2440–3050 m in New Mexico. Flowering June–August.

DISTRIBUTION: Introduced from Europe, common to the north. New Mexico CF, GR, RA, SM, TO.

COMMENT: *Poa palustris* appears to intergrade in form and habitat with *P. interior*, and frequently entire populations cannot be satisfactorily assigned to one or the other taxon.

Poa pratensis L.

Poa pratensis L., Sp. Pl. 67. 1753. *Poa agassizeussis* Boivin & D. Love, Bernard, Svensk Bot. Tidsker, 53:371. 1959, *nomen nudum*; *Poa agassizeussis* Boivin & D. Love, Naturaliste Canad. 87:176. fig. 1. 1960. Kentucky Bluegrass.

Perennial with extensive creeping rhizomes, often forming dense sods. Culms 0.5–80 cm tall, only slightly compressed. Leaves green to glaucouscent. Sheaths prominently nerved, closed $\frac{1}{4}$ – $\frac{1}{2}$ their length, glabrous or occasionally sparsely long villous. Ligules 0.5–3 mm long, mostly truncate, ciliate on upper margin, glabrous to minutely

scabrous on back. Blades flat or folded, soft or occasionally rather firm, strict, 1.5–2.5 (5) mm broad, prominently keeled and prow tipped, those of upper culm 1–10 cm long and only slightly divergent. Panicles (1.5) 5–10 (16) cm long, pyramidal to elliptic, mostly erect with (2) 4 or more branches at lower nodes, branches sparsely scabrous. Axial internodes mostly 1–2 cm long, rarely over 3 cm long. Spikelets compact-ovate, crowded on branches, strongly compressed, green or purplish, 2–7 mm long, 2–7 flowered. Glumes 1–3-nerved, strongly keeled, more or less scabrous on upper $\frac{1}{2}$ of keel, the first narrow, often somewhat curved inward, both sharply acute and about $\frac{2}{3}$ – $\frac{3}{4}$ the length of subtended lemma. Lemmas 2–4 mm long, 5-nerved, intermediate nerves usually faint, glabrous and minutely papillose-roughened between nerves, keel and marginal nerves densely villous, rarely with few hairs on intermediate nerves. Callus with copious tuft of kinky hairs from $\frac{1}{2}$ to as long as lemma. Paleas glabrous, or closely and finely scabrous on keels, glabrous between keels. Rachilla internodes glabrous, short. Flowers perfect. Anthers 1.2–2 mm long. Chromosome numbers: 25–127 (with nearly every intervening number recorded).

HABITAT: An aggressive and variable weedy species composed of numerous apomictic races worldwide, but which are poorly understood in our region. Widespread from ponderosa pine zone to subalpine, where it often forms a turf along water courses. Occasional in lower habitats along perennial water courses, in greasewood communities, and on northeastern plains of New Mexico. Commonly planted in lawns and pasture mixes. Important as a soil-stabilizer and as a forage. Naturalized from ca 1700–3500 m. Flowering May–September.

DISTRIBUTION: Holarctic, now occurring worldwide except for low elevations in the tropics. Introduced or possibly native in temperate latitudes of North America. First collected in New Mexico in 1887 by S. M. Tracy, near Santa Fe. New Mexico: B, CB, CT, DA, LA, LN, MK, OT, RA, SD, SF, SJ, SM, TO, TR, and undoubtedly all others.

COMMENT: Successful synthetic hybrids have been formed between *Poa pratensis* and members of most other sections of *Poa*. It appears that such hybridization is a continu-

ing process in nature. Specimens and partial populations identifiable as *P. pratensis* infrequently display intermediate characteristics between it and some sympatric native species. A peculiar, possibly native form, which has prominent long spiculae on ventral blade surfaces and is sparsely hairy between lemma nerves, has been collected in MR and LN counties.

Poa reflexa Vasey & Scribn.

Poa reflexa Vasey & Scribn., Contr. U.S. Natl. Herb. 1:276. 1893. HOLOTYPE: Letterman Kelso Mt. near Torrey Pk. in 1885 (US 28544900). Nodding Bluegrass.

Short-lived perennial. Culms slender, loosely tufted, 1–6 dm tall. Leaves bright green, mostly cauline. Sheaths closed $\frac{1}{3}$ – $\frac{2}{3}$ the length, keeled, smooth. Ligules 1.5–3.5 mm long, truncate to obtuse, entire to jagged, glabrous. Blades of the culm flat or folded, 1.5–4 mm broad, upper 2–10 cm long, prominently keeled and prow tipped (broad and short relative to *P. leptocoma*). Panicles nodding, open, pyramidal, 4–15 cm long, branches capillary, glabrous, mostly 1–3 per node, widely divergent to steeply reflexed, with spikelets crowded in distal $\frac{1}{3}$. Axis internodes mostly shorter than 4 cm. Spikelets green to purplish, strongly compressed, mostly 3–4-flowered, ovate, compact, rachilla rarely visible in side view. Glumes acute, smooth or sparsely scabrous on keel near tip, subequal, the first lanceolate, 1-nerved, the second broadly lanceolate, 1–3-nerved. Lemmas broadly lanceolate, acute, 5-nerved, densely villous-pilose on keel (to near the tip) on marginal nerves and often on intermediate nerves, mostly glabrous between nerves to sparsely pubescent between them on upper florets, hyaline margin narrow. Callus long webbed. Paleas villous (sometimes obscurely so) on keels, with long and short cells between keels. Flowers perfect, frequently cleistogamous. Anthers 0.25–1 mm long. Chromosome numbers: 28.

HABITAT: Subalpine, alpine, from dry open ground to meadows, streams, and bogs, 3050–3660 m in New Mexico. Flowering July to August.

DISTRIBUTION: Middle and Southern Rocky Mountains (very sporadic westward), occurring from s Montana to n Arizona and n New Mexico: CF, SF, TO.

COMMENT: See comment under *Poa leptocoma*, and subgeneric placement above. *Poa reflexa* appears to be closely related to *P. occidentalis*.

Poa secunda Presl

Poa secunda Presl. Rel. Haenk. 1:271. 1830. TYPE: Haenke, "Cordillera Chilensis," in 1790 (PR, MO, GH). (It has been remarked by Marsh and Keck, among other workers, that the type may have come from s California rather than Chile, but, according to historian S. D. McKelvey (1955), if the 1790 date is correct, this could not be because Haenke had not reached North America until 1791.) *Poa sandbergii* Vasey, Contr. U.S. Natl. Herb. 1:276. 1893. *Poa incurva* Scribn. & Will. *Poa scabrella* (Thurb.) Benth. ex Vasey. *Poa canbyi* (Scribn.) Beal. *Poa gracillema* Vasey. [The following two taxa are considered to be conspecific with *P. secunda* (s. lat.). However, they are considered to be distinctive ecotypes and are described separately: *Poa ampla* Merr., Rhodora 4:145. 1902. TYPE: Vasey 3009 Steptoe, Washington (US 28610400). *Poa nevadensis* Vasey ex Scribn., Bull. Torrey Bot. Club 10:66. 1883. TYPE: Jones Austin, Nevada (US 28558200).] Sandberg Bluegrass. (Pine Bluegrass, Canby Bluegrass).

Perennial, caespitose, Culms densely tufted, erect or divergent, wiry, 1.5–12 dm tall, frequently becoming reddish. Leaves mostly basal, green or occasionally glaucescent. Sheaths nearly open or closed to $\frac{1}{4}$ the length, glabrous to scabrous, weakly keeled. Ligules 1.5–5 (7) mm long, acute to acuminate, entire to lacerate, glabrous to scabrous on back. Blades firm or mostly soft, mostly 1–5 cm long on culm, steeply ascending or sometimes laxly so, 1–3 mm wide, flat or weakly folded, basal leaves often filiform. Panicles mostly narrowly contracted, 2–27 cm long, branches (2) 3–4 (8) per node, mostly scabrous. Spikelets 3.5–9 (12) mm long, generally more than 3 times as long as wide (closed), 2–6-flowered, more or less terete in cross-section. Glumes lanceolate, 1–3-nerved, with broad hyaline margins, broadest about middle, mostly gradually rounded on margin, mostly smooth below and sparsely scabrous toward tip on keel and less scabrous on lateral nerves. Lemmas relatively long and narrow, tapered to tip from well above middle, acute, obtuse, rounded, or retuse at tip, 5-nerved, intermediate nerves often obscure, weakly keeled or keel obscure, papillose-roughened to scabrous over surface, basal portion glabrous or usually uniformly puberulent.

lent, this infrequently confined to nerves (rarely much denser or longer on nerves). Callus glabrous (sometimes with few short hairs). Paleas mostly scabrous on keels to puberulent on lower half, puberulent between keels below and scabrous in upper portion. Rachillas glabrous, scabrous, or puberulent, usually elongate and visible from side view. Flowers perfect, anthers occasionally abortive. Anthers 1–3.8 mm long, yellow or purple or both. Chromosome numbers 44, 56, 61–66, 68, 70–72, 78, 81–106.

HABITAT: Upper pinyon-juniper, ponderosa pine, subalpine, and alpine, 2130–2440 m and 3350–3810 m in New Mexico. Flowering June–August.

DISTRIBUTION: South America in Chile and Argentina. North America, se Alaska across s Canada (sporadic east of Rocky Mountains), all w United States and n plains states to Great Lakes region, and Gaspé Peninsula. Infrequent in n Arizona. New Mexico: SJ (*canbyi* form), SF & TO (alpine forms usually referred to *P. canbyi*).

COMMENT: *Poa secunda* (*s. lat.*) is a large, polymorphic, facultatively agamosperous species composed of many ecotypes. Of 40 different taxa that have been proposed, modern taxonomic treatments of this group recognize as few as one to as many as 13 species and subspecies. Although I have not studied this group in depth, I am familiar with the variation patterns in other agamous complexes in *Poa* and am inclined to follow the monographers who recognize only one species here. Beyond this, it would be useful from an ecological perspective to recognize the more distinctive races at a subspecific level. However, appropriate name combinations are not available, and, until the most recent revision of the complex is published, I refrain from proposing any new ones. New Mexico is at the southern boundary of the complex where several of the more customarily recognized races are apparent and allopatric. The above description applies to Rocky Mountain forms included as species of the “scabrellae” group by A. S. Hitchcock. The following descriptions apply to two forms he included as species in the “nevadenses” group. It must be kept in mind, though, that these are intergradient over their greater ranges.

The highly variable alpine forms of this complex occurring in the Rocky Mountains are usually referred to *P. canbyi*, but frequently they are exceedingly difficult to differentiate from *Poa glauca*, and occasionally from *P. arctica*. This taxon can generally be distinguished from the latter alpine species by the presence of more lax foliage, generally reddish culm bases, long acute ligules, short, uniform lengthed puberulence of the lemmas, and elongate spikelets. However, it appears that there are continuous intergrades between these facultatively agamous species.

Poa ampla phase of *Poa secunda*
Big Bluegrass

Robust perennials, infrequently rhizomatous. Culms several in large tufts, 6–18 dm tall. Leaves green to very glaucous. Ligules 0.25–4 mm long, sparsely to densely scabrous on back, obtuse to truncate, entire to jagged. Blades 2–5.5 mm wide, those of culm 9–20 cm long, flat to weakly folded, mostly rather firm. Panicles mostly 12–25 cm long, rather narrow. Glumes 3-nerved, scabrous on keel. Lemmas 4–6 mm long, glabrous and papillose-roughened all over to very sparsely puberulent on lower keel and marginal nerve, scabrous or glabrous on upper keel. Callus glabrous. Paleas scabrous on keels. Rachillas glabrous. Flowers perfect. Anthers 1.5–3.5 mm long. Chromosome numbers: 62–65, 68, 70–71, 91, ca 100.

HABITAT: The only records of *Poa ampla* in New Mexico have been from ponderosa pine zone, in open ground, 2130–2440 m. Flowering May–August.

DISTRIBUTION: Alaska, Alberta, British Columbia, North Dakota, South Dakota, Nebraska, Montana, Wyoming, Idaho, Washington, Oregon, Nevada, California, and nw $\frac{1}{3}$ Colorado. Introduced into New Mexico along roads and in campgrounds in CB, GR (SM?, not seen); all three collections made since 1980.

Poa nevadensis phase of *Poa secunda*
Nevada Bluegrass

Similar to *P. secunda* 5–10 dm tall, very leafy throughout, sheaths and blades often scabrous, flat or folded, bright to pale green,

1–3.5 mm wide, upper ligules 3–6 mm long, acute to acuminate. Panicles narrow, elongate, to 25 cm long, somewhat loose. Spikelets 2–5-flowered, 4–8 mm long. Glumes more strongly keeled than typical of species. Lemmas 3.5–5 mm long, scabrous apically or throughout, usually somewhat obtuse. Chromosome numbers: 62, 63–66, 70.

HABITAT: In New Mexico: Moist ground around springs and moist meadows, ponderosa pine zone, 2350–2450 m. Flowering June–July.

DISTRIBUTION: California, Oregon, Montana, Idaho, Wyoming, Colorado, Utah, Arizona, and New Mexico. Not collected in New Mexico since 1906, CF (Bell), CT (Fitzgerald Cienega, n of Reserve). A collection of Dr. Bigelow's 1853–4 #3 (NY) made somewhere between Fort Smith, Arkansas, and the Rio Grande, also appears to represent this form.

Poa tracyi Vasey

Poa tracyi Vasey, Bull. Torrey Bot. Club 15:49. 1888. LECTOTYPE: *Tracy*, New Mexico, mesa sides near Raton, in 1887 (US 556764). *Poa flexuosa* var. *robusta*. *Poa* f. var. *occidentalis*; *Poa occidentalis* (Vasey) Rydb. (not *P. occidentalis* Vasey). *Tracy* Bluegrass.

Perennial, frequently subrhizomatous. Culms erect or decumbent at base, 25–125 cm tall, mostly glabrous. Leaves blue-green, mostly cauline. Sheaths mostly shorter than internodes, closed $\frac{1}{2}$ – $\frac{9}{10}$ the length, strongly keeled, retrorsely puberulent, or scabrous, mostly glabrous. Ligules obtuse to acute, glabrous to abundantly hairy on back, those of the upper leaves to 4.5 cm long, mostly shorter than leaf is wide. Blades strongly keeled, flat, prominently prow shaped at tip, upper ones 6–18 cm long, 2–5.5 mm wide. Panicles narrowly to broadly pyramidal, (8) 13–29 cm long. Branches 1–5 per node, 2.5–18 cm long, sparsely flowered in distal $\frac{1}{2}$, widely spreading to reflexed at maturity, sparsely scabrous. Axis internodes mostly over 4 cm long. Spikelets strongly compressed, oblong, 3–8 mm long, mostly shorter than pedicels, 2–8-flowered. Glumes narrowly lanceolate, acute, the first usually less than $\frac{1}{2}$ the length of first lemma, 1-nerved, the second slightly shorter than first lemma, 1–3-nerved. Lemmas 2.6–5 mm long, lanceolate, keel scarcely incurved at tip, pale green with

white hyaline margins, 5-nerved, intermediate nerves often obscure, villous on lower $\frac{1}{2}$ – $\frac{3}{4}$ of keel, less so on marginal nerves, usually sparsely puberulent between nerves at base. Callus with long cobwebby hairs abundant (rarely nearly absent). Paleas mostly minutely scabrous on keels, sometimes also minutely puberulent near base, with long and short cells between keels. Rachillas usually visible from side view, glabrous. Flowers perfect or pistillate, two types usually mixed within panicle, sometimes all one or the other (partially gynodioecious). Anthers vestigial (aborted) or 1.25–3 mm long. Chromosome numbers: 28, 28+1 fragment.

HABITAT: Montane. In gambel oak thickets, mixed-conifer and spruce-fir forest openings, and subalpine meadows, mesic sites, in humus-rich soils, 2000–3500 m. Flowering May–mid-July and in south central New Mexico in August.

DISTRIBUTION: Southern rocky Mountains of Colorado and New Mexico; B, CF, LN, OT, RA, SM, U. All of the Wyoming records of *P. tracyi* that I have seen represent other species, especially *P. leptocoma*.

COMMENT: Mature material of *Poa tracyi* is easily distinguished (by longer, or vestigial anthers) from *P. occidentalis*, *P. leptocoma*, and *P. reflexa*. *Poa tracyi* is morphologically very similar to the more western *P. curta* (s. *auct*), and both species are partially gynodioecious. However, they are geographically isolated from one another, and the morphological distinctions between them are not bridged.

Poa trivialis L.

Poa trivialis L., Sp. Pl. 67. 1753. Meadow or Roughstem Bluegrass.

Short-lived perennial, frequently stoloniferous. Culms loosely tufted, erect, or decumbent and rooting at lower nodes, 4–11 dm tall, smooth to densely scabrous. Leaves bright green, mostly cauline. Sheaths closed for $\frac{1}{4}$ – $\frac{1}{3}$ the length, often keeled and prominently striate. Ligules (1.5) 3–10 mm long, acute, entire or lacerate, glabrous or sparsely scabrous on back. Blades of culm flat, 2–8 mm wide, 10–25 cm long, lax, tips scarcely prow shaped. Panicles (4) 6–22 cm long, open, pyramidal to oblong, slender branches spreading-ascend-

ing in flower and fruit, many flowered from near base, lower branches often in 5s. Axis internodes 2–5.2 cm long. Spikelets small, 3–5 mm long, strongly compressed, 2–4-flowered, ovate to elliptic. Glumes unequal, the first narrowly lanceolate, more or less incurved and with narrow white hyaline margin, the second somewhat broader and less curved, the 1–3 nerves prominent, pale, and mostly scabrous. Lemmas 2.5–4 mm long, prominently 5-nerved, smooth or faintly, finely papillose-roughened, sparsely villous on lower keel, otherwise glabrous. Callus with web of villous hairs $\frac{1}{2}$ as long to longer than lemma. Paleas very finely and closely scaberulous to papillose-roughened on keels. Rachilla internodes short, slender, and glabrous. Flowers perfect. Anthers 1.4–2 mm long. Chromosome numbers: 14, 15, 28.

HABITAT: Expected to spread in montane New Mexico in shady, cool, wet to mesic soils, in disturbed sites, from 1980–3050 m. Flowering May–July.

DISTRIBUTION: Introduced from Europe, common in nw and ne U.S. but infrequent in interior West. The one New Mexico record of this species (*Soreng & Ward 1609*, Eagle Cr., in 1982) was growing in wet soil, at water's edge, at about 8000 ft: L.N.

COMMENT: This species is superficially very similar to *P. occidentalis*, but has branches flowered from near the base; has longer anthers and is partially self-incompatible; has a frequently stolonous habit, tuberculate nobs on the palea keels, no pubescence between

the lemma nerves or on the marginal nerves, and narrow, scarcely prow-tipped blades.

ACKNOWLEDGMENTS

Acknowledgments are due to V. L. Marsh, Elizabeth Kellogg, Lewis Arnow, and David D. Keck. I am grateful to Nancy Soreng, Rich Spellenberg, Kelly Allred, and all others who have reviewed this paper.

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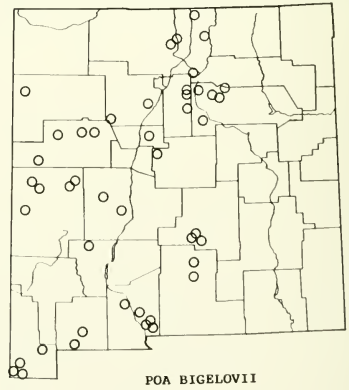
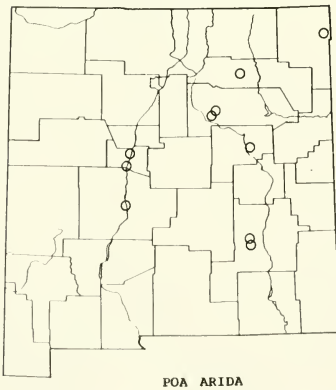
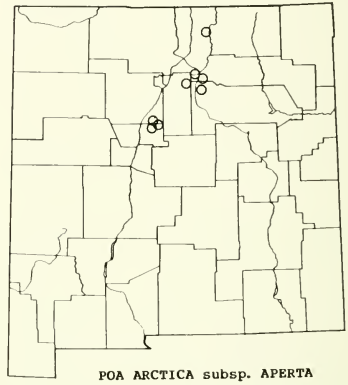
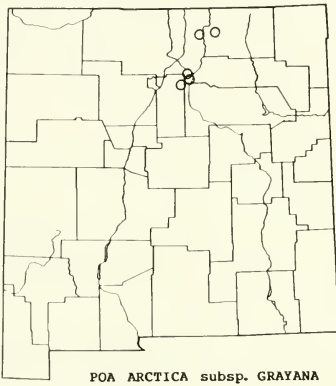
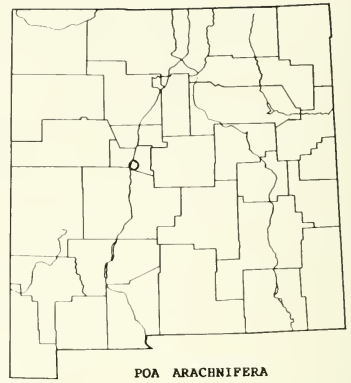
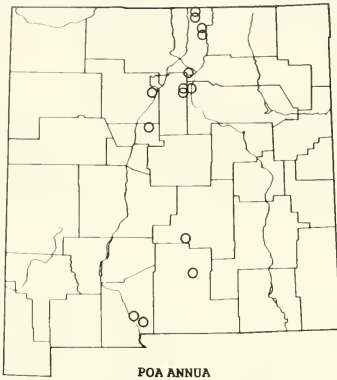


Fig. 1. New Mexico distributions for *Poa* spp., as labeled.

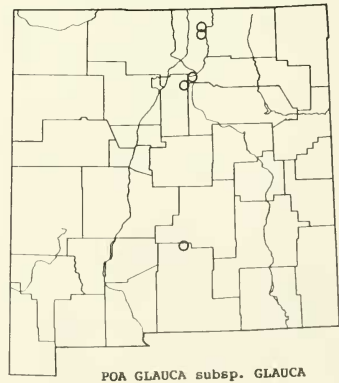
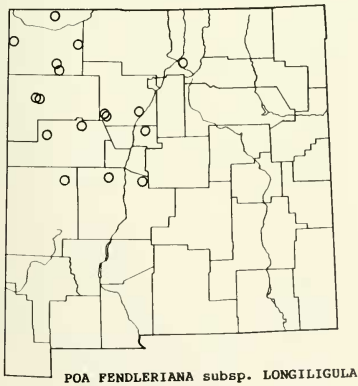
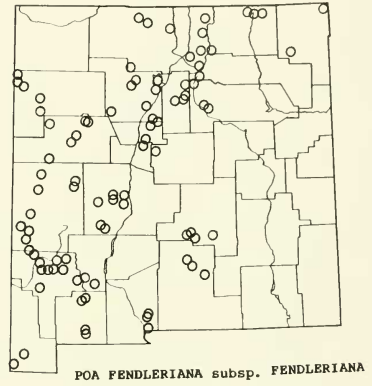
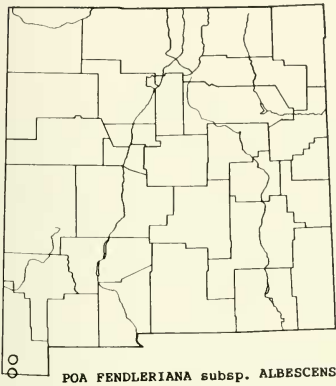
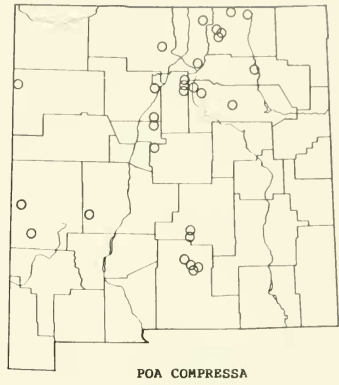
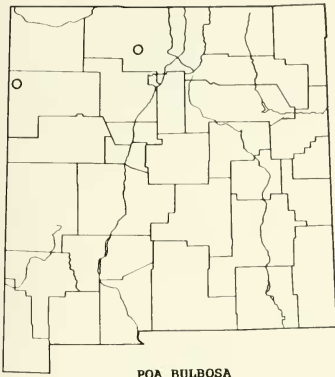


Fig. 2. New Mexico distributions for *Poa* spp., as labeled.

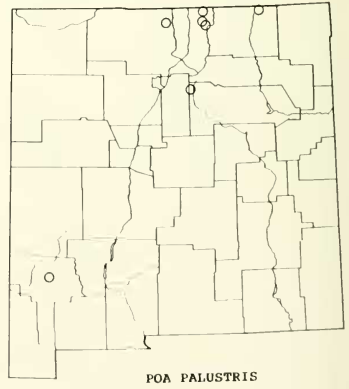
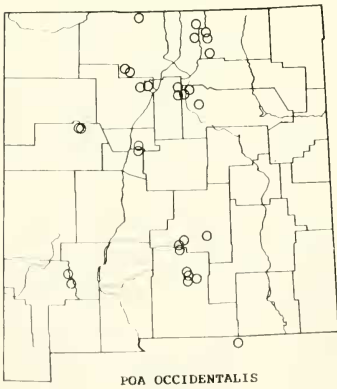
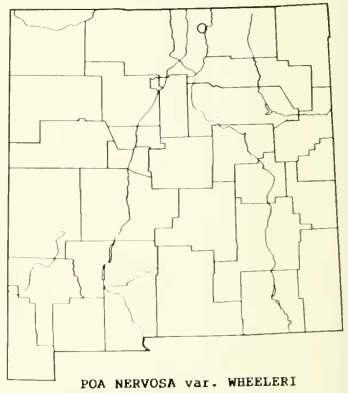
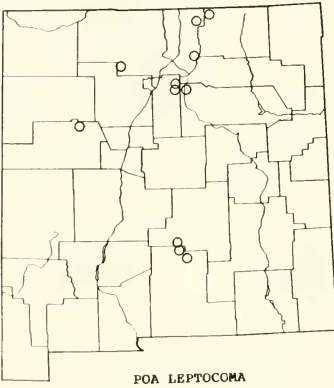
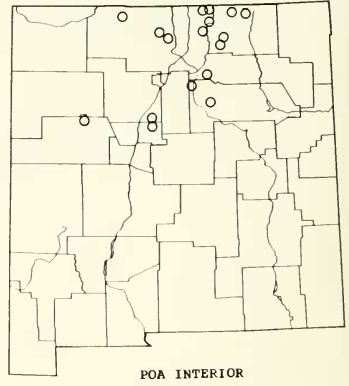
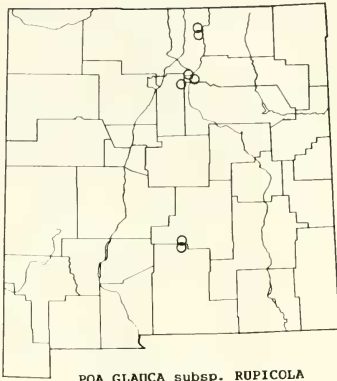
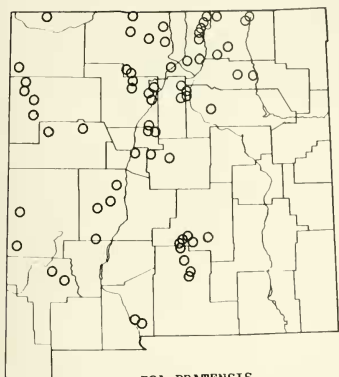
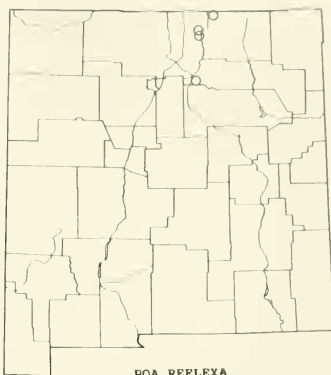


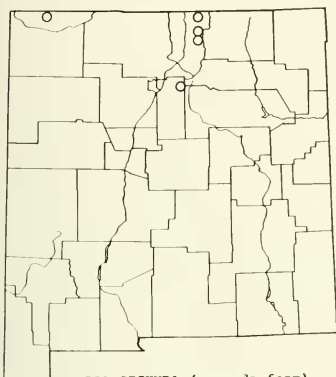
Fig. 3. New Mexico distributions for *Poa* spp., as labeled.



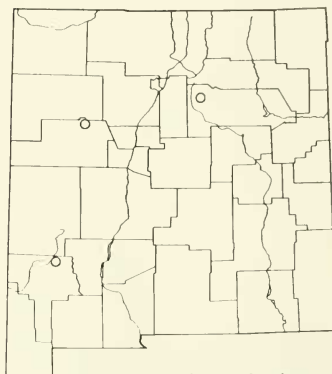
POA PRATENSIS



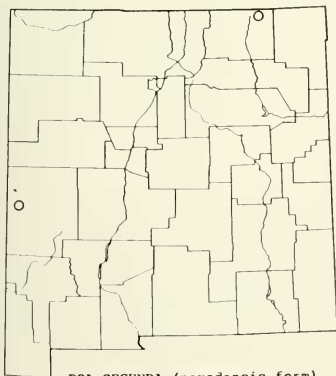
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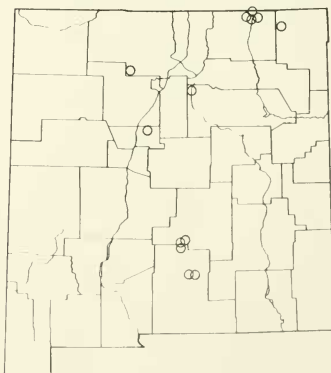
POA SECUNDA (secunda form)



POA SECUNDA (ampla form)

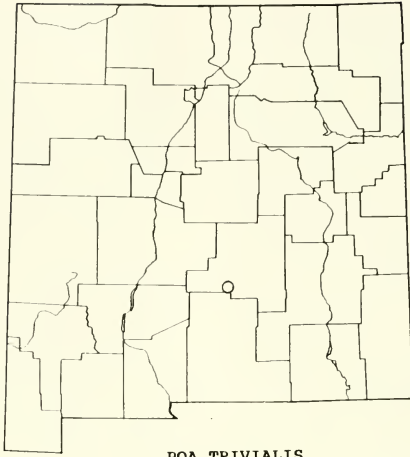


POA SECUNDA (nevadensis form)



POA TRACYI

Fig. 4. New Mexico distributions for *Poa* spp., as labeled.



POA TRIVIALIS

Fig. 5. New Mexico distribution for *Poa trivialis*.